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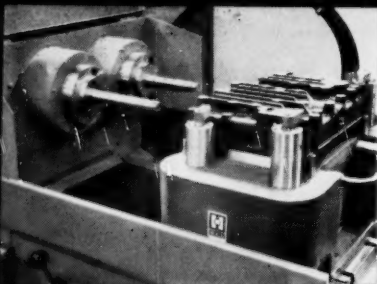
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**FREE CATALOG
NOW!**



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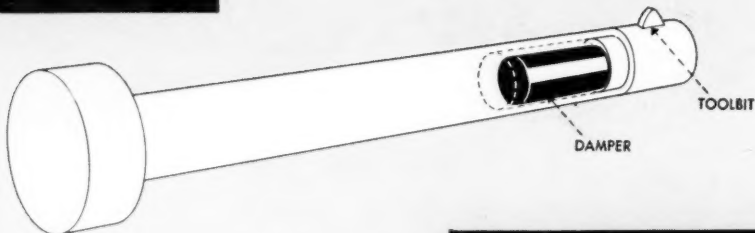
5107 PACIFIC BLVD.

LOS ANGELES 58, CALIFORNIA



Long valve body holes are successfully bored, two at a time, with damped quills on this Heald Bore-Matic setup. Surface finish is materially improved by damping.

How Inertia Damping PREVENTS QUILL CHATTER



● Self-excited vibration in relatively long boring bars often presents a serious problem—particularly where a fine finish is required.

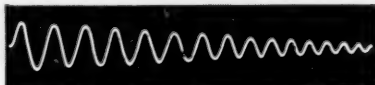
Heald's answer to this problem is the damped quill—a method of vibration control which has proved both simple and remarkably effective in a great many cases.

The damping effect is obtained by means of a plug of heavy material, inserted in the bored-out end of the quill. Being slightly smaller than the bore, the damper plug "floats" in its enclosure as the quill rotates, and its inertia tends to oppose or cushion any vibratory movement of the quill itself. The effectiveness of the damped quill is well illustrated by the microphotographs and oscillograph records shown at the right.

If you have a problem of self-excited quill chatter, ask your Heald representative for the complete damped quill story—or write for our special folder on damped quill applications. Remember—when it comes to precision finishing, it pays to come to Heald.



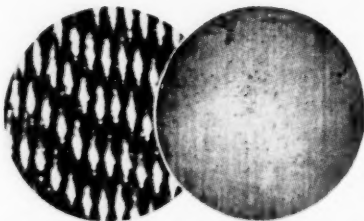
Case Study
No. 2242-96 in
**PRECISION
PRODUCTION**



Oscillograph record showing normal rapidity with which quill vibration tends to die out.



Oscillograph record showing how vibration in a properly damped quill decreases much more rapidly.



Above, at left, is a photograph, magnified 8 times, showing a chattered work surface before damping. At right, with same magnification, the surface finish has been obviously improved by damping the quill.

INTERNAL AND ROTARY SURFACE GRINDING MACHINES AND BORE-MATICS

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

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MODERN Machine Shop

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HOW THE SLAYSMAN COMPANY REDUCED THREADING TIME BY 97%

The Slaysman Company, a large machine shop and partsub-contractor in Baltimore, reduced threading time on one contract operation from 2 hours to 4 minutes by the installation of a LANDMACO Threading Machine.

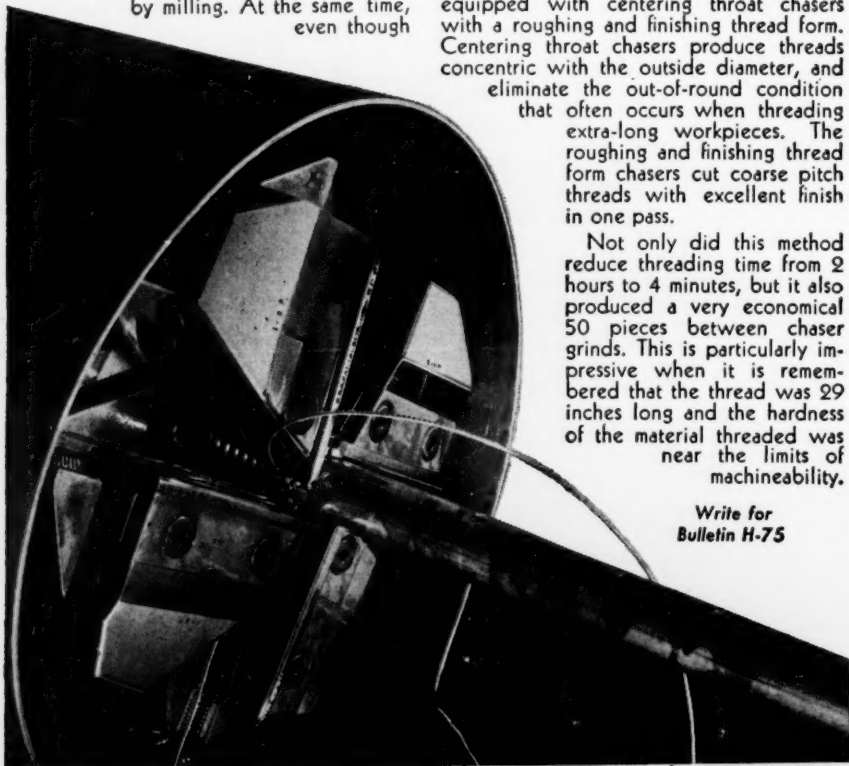
This contract required the cutting of a 1" diameter 5 pitch Acme thread 29" long on C1141 steel to a Class 3 fit. Original production plans were to generate the thread by milling. At the same time, even though

the specifications and the hardness of the material seemed to preclude other methods, we were asked if we could suggest a more efficient threading process.

Based on our recommendation after studying the thread specifications, a 1½" LANDMACO Single Head Leadscrew Machine with an extra-long carriage was installed. The LANCO threading head was equipped with centering throat chasers with a roughing and finishing thread form. Centering throat chasers produce threads concentric with the outside diameter, and eliminate the out-of-round condition that often occurs when threading extra-long workpieces. The roughing and finishing thread form chasers cut coarse pitch threads with excellent finish in one pass.

Not only did this method reduce threading time from 2 hours to 4 minutes, but it also produced a very economical 50 pieces between chaser grinds. This is particularly impressive when it is remembered that the thread was 29 inches long and the hardness of the material threaded was near the limits of machineability.

Write for
Bulletin H-75



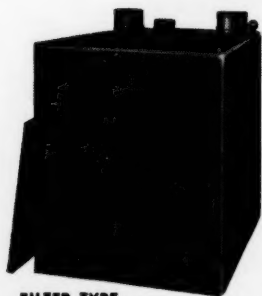
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CYCLONE TYPE
for tool and general grinding, polishing, wood-working, plastics, glass, ceramics, etc.



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No — it's not a tool of production — it's a tool of destruction! . . . it is **ABRASIVE GRIT** — by-product of your grinding, cutting and finishing equipment.

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A MUST FOR DUST!

These units trap dangerous dust before it can harm the health and efficiency of your employees and damage valuable machinery . . . These two distinct types of Duskolectors offer the best and most economical solutions to your special dust problems. Hammond experience will help you too, in eliminating the dust menace . . . Write today for bulletin.

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INC.

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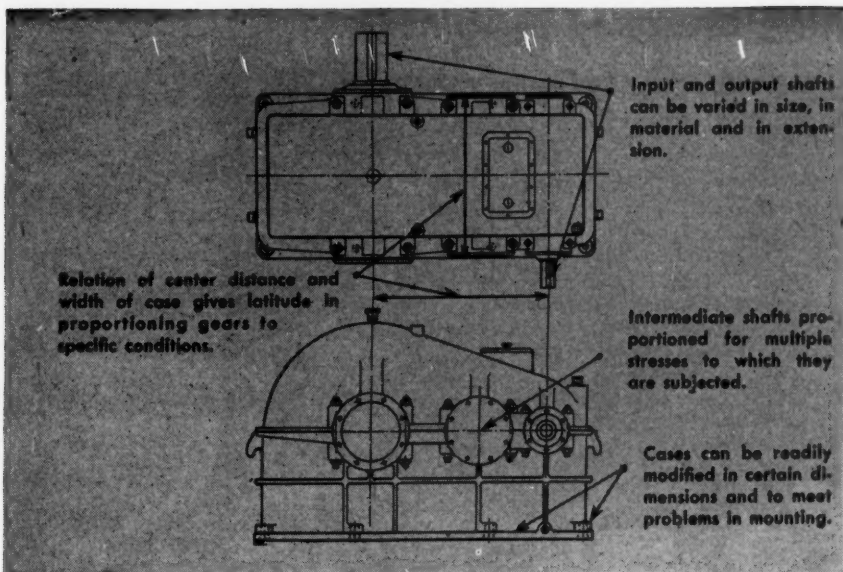
- **3/4" square drive** provides strength without bulk. 12-point socket openings rotate nuts where handle can swing only 30°. Regular and extra-deep designs.
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INDUSTRIAL TOOLS**

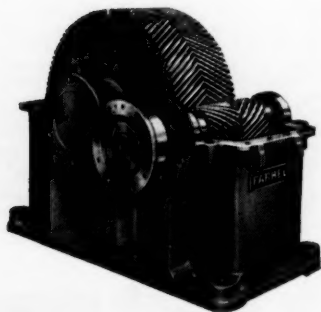
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Farrel drives
are measured
to fit the job**



FB-802

When speed reducers are *designed for the job*, they are likely to perform better and last longer than the usual "standardized" drive. Each unit fits its application . . . without compromise.

That is why Farrel speed reducers give such a good account of themselves. They are standard only in their principal features; adaptable in critical detail, as the above drawing shows. This idea of design flexibility has resulted in the solution of innumerable application problems.

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if you do ANY of these jobs...

*you need this
**jack-of
-All-jobs...***

No. 7 Combination Shear,
Punch and Coper

the **Kling COMBINATION SHEAR-PUNCH-COPER**

Remember, when you were a boy, what a hit that 6- or 7-blade jack-knife made? You could do just about everything with it!

This Kling Combination Shear, Punch and Coper will make an equally big hit in your shop. It does any of the jobs shown above, and a lot more. It can turn out the same work as a separate punch, angle shear, bar shear, plate shear and notcher. Best of all, it costs only a few dollars more than a single-purpose punch.

To gain maximum speed and safety, each end operates

independently. Foot pedals allow operators to keep hands free to hold work.

In shops of every size, the Kling Combination is speeding production, reducing man-hours, and increasing profits on metal-working jobs. Investigate what it can do for you. Available in 3 sizes, for light, medium and heavy work. Ruggedly built, and meets machine tool precision standards.



Write for latest **FREE Bulletin No. 347**. Gives complete details of jobs this Machine can handle; also capacities, other technical data and specifications.

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Double Angle Shear



Rotary Shear



Punch

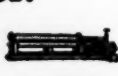
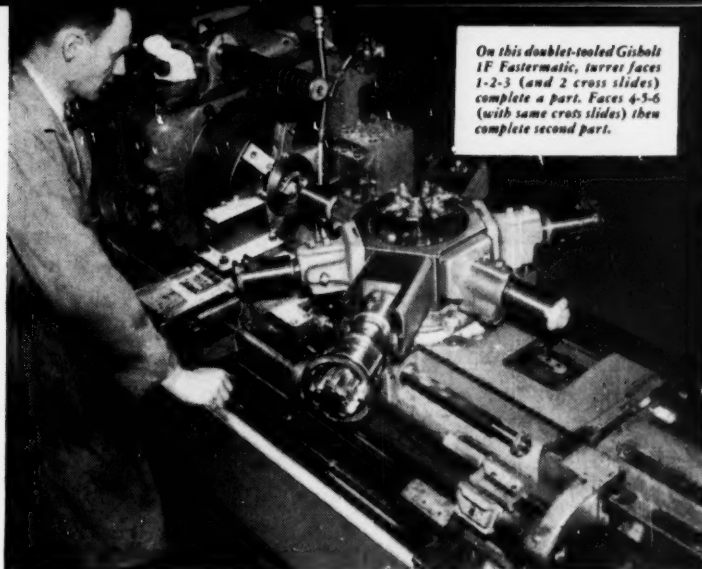


Plate Bending Roll

HOW DUPLICATE TOOLING... AND A FASTERMATIC...



On this double-tooled Gisholt IF FASTERMATIC, turret faces 1-2-3 (and 2 cross slides) complete a part. Faces 4-5-6 (with same cross slides) then complete second part.

doubled production!

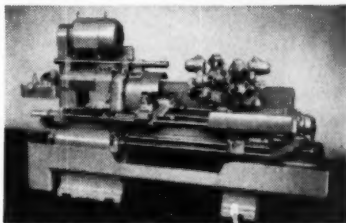
The time *and* unit cost for machining these cast iron pulley flanges were cut in half when the FASTERMATIC with double tooling took over the job.

Just three turret faces were needed to complete the machining and threading on each part. Therefore, tooling is repeated on the other three turret faces so that *two* parts are finished with each revolution of the turret. Production is doubled over the old method . . . time lag is cut to a minimum . . . there's twice the time between tool changes.

This smart setup illustrates one of the many ways FASTERMATIC Automatic Turret Lathes give you greater efficiency and lower costs on a broad range of jobs. And one operator can usually handle two or more machines. Ask for the facts.



Floor-to-floor time for these pulley flanges is down to 1.75 minutes. Duplicate tools and collapsing taps on the turret rough and finish the bore, chamfer and cut threads. Front and rear slides shave the angle and form the radius on the O.D.



Gisholt IF FASTERMATIC Automatic Turret Lathe

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin



THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



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CINCINNATI FILMATIC 10" x 36"
Plain Hydraulic Grinding Machine



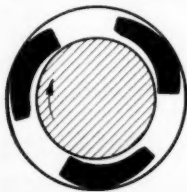
CINCINNATI

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GRINDING MACHINES • CENTERLESS LAPPING
MACHINES • MICRO-CENTRIC GRINDING MACHINES

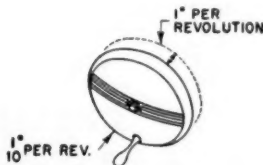
Look at it...

PLAIN HYDRAULIC GRINDERS

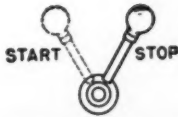
They're dependably accurate, easy to operate; they remove metal rapidly. A few advantages of CINCINNATI FILMATICS are illustrated here.



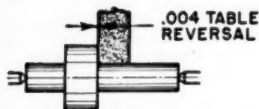
Grinding wheel spindle bearings are FILMATICS. They are dependable—require no adjustment for any type of finish.



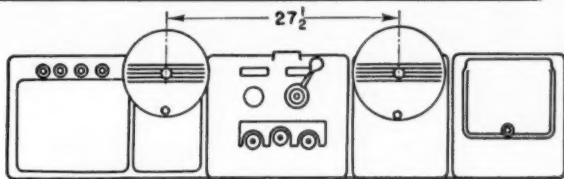
Two-speed manual table traverse; for convenience in setting up the machine.



Single START-STOP lever for coolant flow, head-stock spindle rotation and table traverse; reduces operating fatigue.



Accuracy of table reversal .004"; for safely grinding close to shoulders.



Convenient arrangement of controls for comfortable, efficient operation.

These and many other advantages of CINCINNATI FILMATICS are preferred by shopmen everywhere. Brief specifications will be found in Sweet's Machine Tool

Catalog. Complete data in two publications: No. G-566-2 for the 6" and 10"-L size; No. G-603 for the 10" and 14"-L size. Write for copies.

**CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO**



*Eliminate
Work Transfers!
Cut Set-up Time
In Half!*

**NO.
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—ATTACH TO COMPANY LETTERHEAD—

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Send details on No. 50 and other Knight milling machines.

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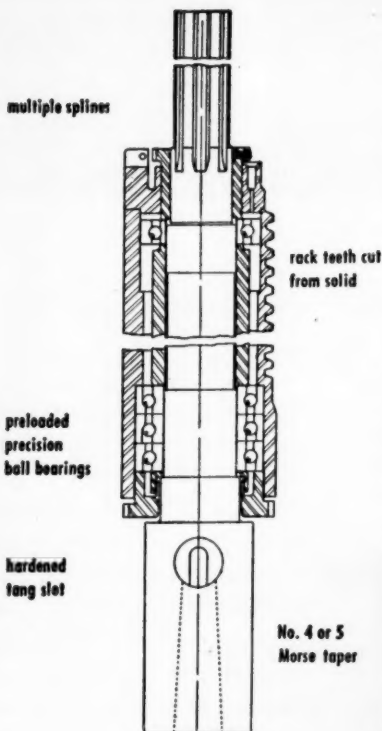
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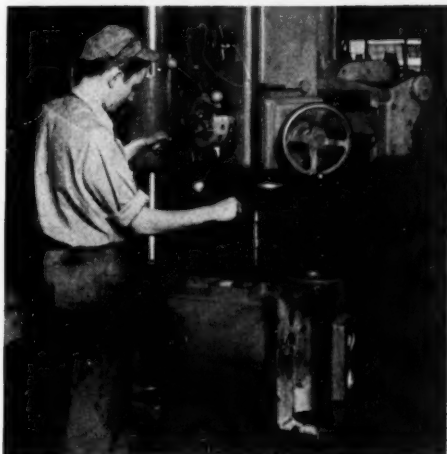
In the photo at the right the operator drills and taps a total of 35 holes, on five faces of the casting, by using a Cincinnati Gilbert Universal Table.

RADIALS
HORIZONTAL BORING MILLS
ACCESSORIES

ACCURATE

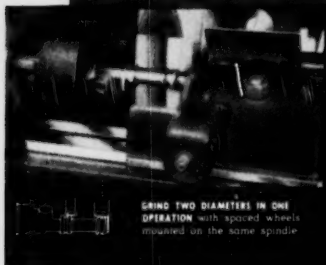
Job after job, Cincinnati Gilbert spindles stay right on "O". The $\frac{4}{4}$ " OD alloy steel quill has a 12" long bearing in the head; spindle is mounted in the quill with three ABEC No. 5 precision, preloaded angular contact ball bearings at the bottom and one at the top. The Gilbert spindle gives maximum accuracy even under strains of improperly sharpened drills, uneven depths of cut, as well as normal thrust load of feeding . . . For sustained accuracy, make your next radial a Cincinnati Gilbert. Write for Bulletin 349.

FLEXIBLE



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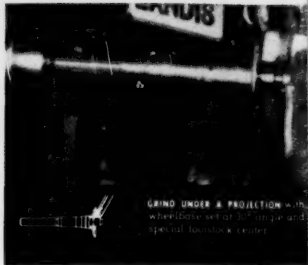
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GRIND UP TO A SHOULDER with dependable and accurate reversal



GRIND UNDER A PROJECTION with wheelbase reset, stoppage and special toolwork center

6 Ways to Cut Grinding Costs with Modern Landis CH Plain Grinders

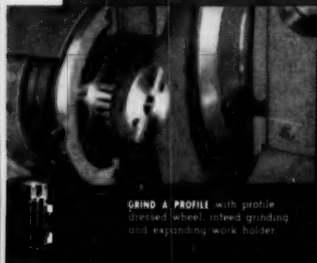


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LANDIS

precision grinders

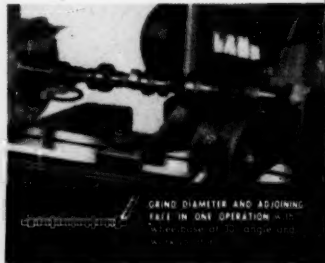
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GRIND A PROFILE with profile dressed wheel, infeed grinding and expanding work holder



TRAVERSE GRIND WITH AUTOMATIC WHEEL FEED wheel feed reset at either reversal point



GRIND DIAMETER AND ADJOINING FACE IN ONE OPERATION with wheelbase reset and stoppage

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<p>SURFACE BROACH REMOVES 3/16"</p>  <p>150 PIECES PER HOUR</p>	<p>INTERNAL BROACH REMOVES 1/32"</p>  <p>200 PIECES PER HOUR</p>	
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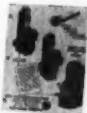
For more information on your particular broaching problem send a part-print or sample and hourly requirements. Address Dept. MM.

For more information on American
Machines send for Catalog #300.



American BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
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TAPS FLEXIBLE SHAFTS
AND MACHINES
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We invite your inquiries about these highly efficient Jarvis Torqomatics that have outmoded all other slow, expensive and highly perishable machines of the past.

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THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT



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NUT TAPS

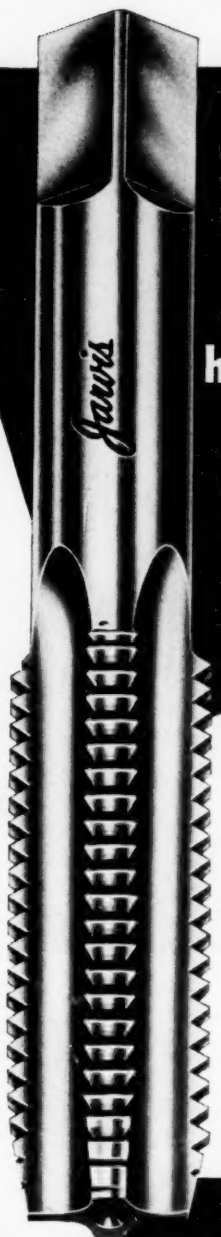


PULLEY TAPS

JARVIS POWER TOOLS

include:

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ROTARY FILES
FLEXIBLE SHAFTS and
MACHINES • TUNGSTEN CARBIDE
REAMERS and MILLS • DRILLS
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Jarvis TAPS

AN INDUSTRIAL TAP FOR INDUSTRIAL USERS

have "Custom Made"

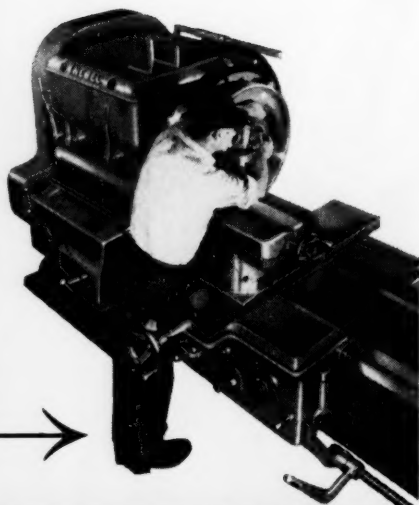
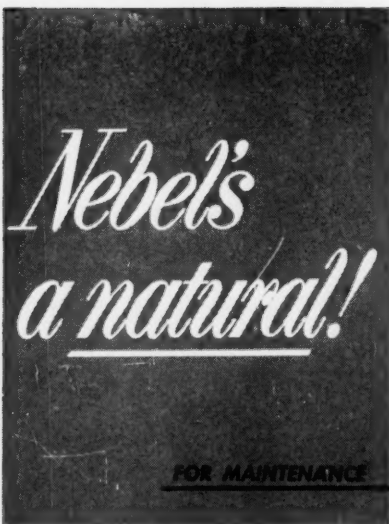
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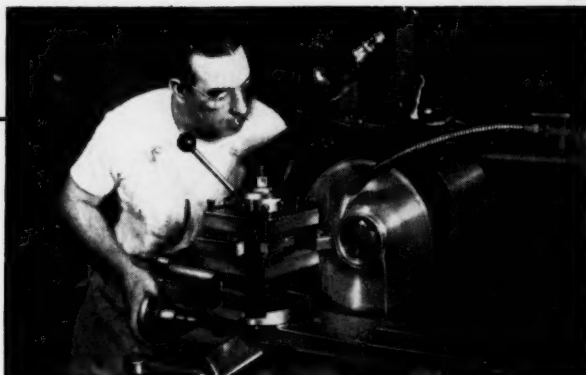
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THE CHARLES L. JARVIS CO.
MIDDLETOWN IN CONNECTICUT




FOR PRODUCTION



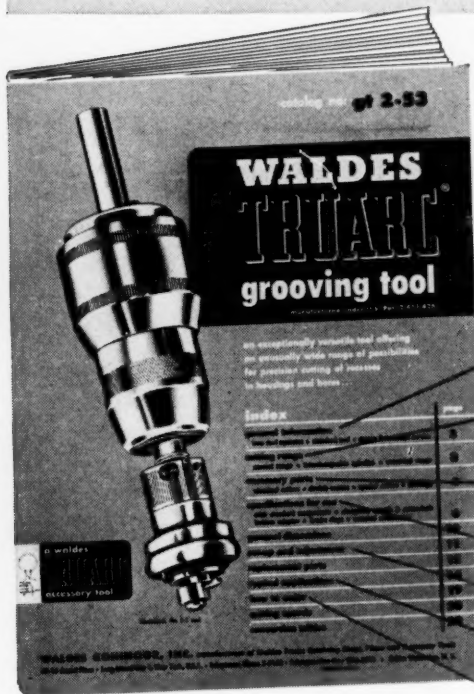
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NEBEL GAP LATHES, removable block gap and extension bed gap, offer larger swing and center distance capacity... combine low price with high quality. Get full information today! The Nebel Machine Tool Co., Cincinnati 25, Ohio. Members of the National Machine Tool Builders' Association.

Nebel

the workhorse of the
metalworking shop since 1899

Now, a complete new 20-page catalog for the Waldes Truarc Grooving Tool



*** the One Versatile Tool Designed for High Speed, Precision Cutting of Internal Grooves in Housings and Bores

Here is the most complete catalog ever published—on the cutting of internal concentric recesses. Complete with descriptive, illustrated information and data charts showing how the Waldes Truarc Grooving Tool can solve virtually every internal grooving problem you may have. Shows how even *unskilled labor* can perform precise, production-line operations.

Facts and figures on the Waldes Truarc Grooving Tool . . . its special features, modifications and adaptations.

Data showing how the Waldes Grooving Tool cuts accurate grooves in housings with diameters from .250 to 5.000 inches.

Charts describing various cutters: single, multiple, beveled and special profiles. Description of bottom adaptors, elongated spindles, and extended bushings . . . for solving particular problems.

Location of grooves under varying conditions: in bores, housings, and blind holes.

Diagrams and easy-to-follow instructions on the set-up of the Grooving Tool.

5 full pages showing 17 case histories covering the range of typical problems and solutions.

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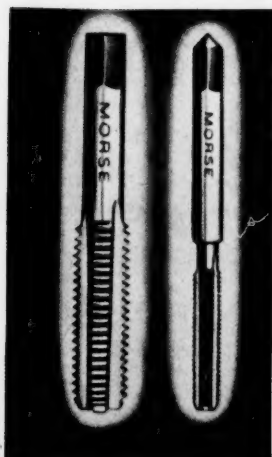
*T-P means
Top Precision*



**"We never knew
what Special-Purpose Taps
could do... 'til we
got these NEW
MORSE TAPS!"**

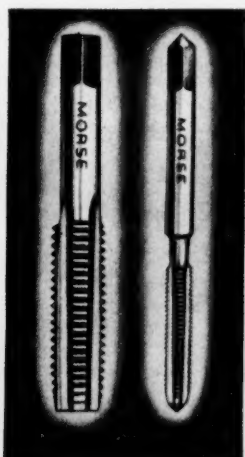


MORSE



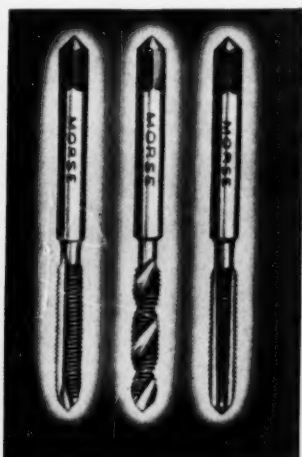
For Brass or Cast Iron

For use in these and other materials with brittle-chip characteristics . . . in hand, machine-screw, and taper-pipe styles. Made with radial face (0 degrees rake — see drawing at right below) and surface-treated to resist abrasion and loading. High-speed steel with commercial ground threads only, except for pipe taps (also furnished with cut threads.)



For Aluminum or Stainless Steel

For use in these and other materials with stringy-chip characteristics . . . in hand, machine-screw, and taper-pipe styles. Made with a 15-degree hook (see center drawing at right below) and commercial ground threads, in high-speed steel only.



Oversize Machine-Screw Taps

For use in materials like plastics or zinc alloys, where difficult to maintain proper tapped-hole size . . . because of the material's abrasive properties or its tendency to shrink, after tapping. Made in certain sizes only . . . in straight-flute . . . spiral point . . . and spiral flute styles. Regularly furnished .002" over standard commercial ground-thread limits. Surface-treated to resist abrasion.

HERE'S THE BIGGEST TAP NEWS IN YEARS . . . and as usual it comes from Morse. These new Special-Purpose Taps . . . set new standards of performance and long life. Get the whole story on this new Morse line *direct and in person* . . . from your experienced Morse-Franchised Distributor, who is always at your service. He has an important new free booklet for you . . . giving complete details on these new Morse Special-Purpose Taps, and full information on the new Unified Threads.

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Warehouses in New York, Chicago, Detroit, Houston, San Francisco



Cutting Tools

Try an AVEY once . . .
AND YOU'LL NEVER CHANGE

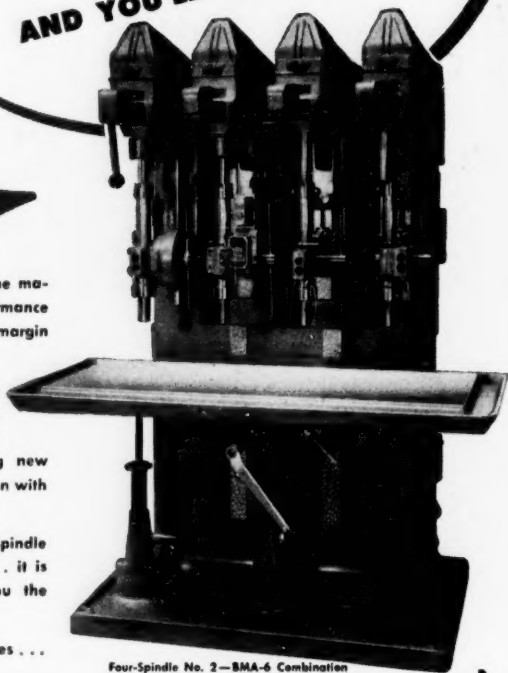
You'll be convinced beyond doubt it is the machine you need for uninterrupted performance and increased production with a wider margin of profit.

Our first-time customers become Avey-minded because the Avey High-Speed, Sensitive and Upright Drilling and Tapping Machines do the job faster . . . setting new records for cost cutting and mass production with minimum of maintenance.

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Even your unusual problem will become routine if you use the services of Avey engineering.



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Consult the yellow pages in your phone book—under Machine Tools—for our nearest representative, or write direct to our factory.

THE Avey DRILLING MACHINE CO.
Cincinnati 1, Ohio

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-swing PEOPLE" SENECA FALLS, NEW YORK

NEW So-swingy AUTOMATION PRINCIPLE CUTS MANUFACTURING COSTS

THE NEW SENECA FALLS WORK LOADER is designed primarily for handling electric motor, axle and other shafts, with or without flanges.

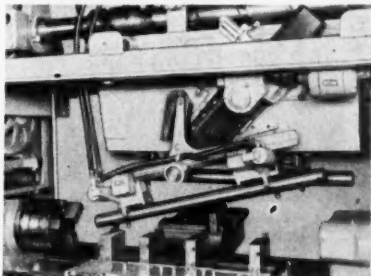
The loading manipulation clears all tools and attachments and leaves the front of the machine clear for adjusting tools.

The loading trolley is in a stationary position while the loader arms rapidly remove the finished part and insert a rough part between the centers. On completion of the loading operation, and during the cutting phase of the machine cycle, the trolley moves to the tailstock end of the machine, where the finished shaft is discharged and a rough piece picked up by the loader arms. This movement accomplished, the trolley moves forward to the loading position just as the machine cycle is completed. No time is lost waiting for the loader.

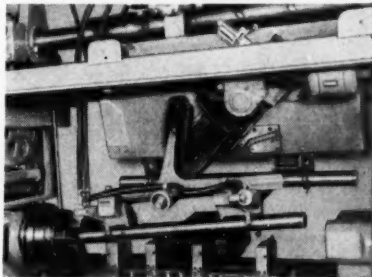
Although the machine is equipped with push button controls for each movement to facilitate set up, the entire loading, machining and ejecting operations are all automatic. This automatic sequence is controlled by a system in which each movement is initiated by the completion of the preceding movement. A swinging cradle located at the tailstock end of the lathe connects with work transfer conveyors which feed rough work to the machine and transfer finished work to other machines or gauging stations for succeeding operations.

The significant advantages of this new principle of automatic work loading and work transfer are: assured safety for operator and system; complete elimination of operator's fatigue; wide range adaptability and an impressive acceleration of net output through the entire manufacturing sequence of a given part.

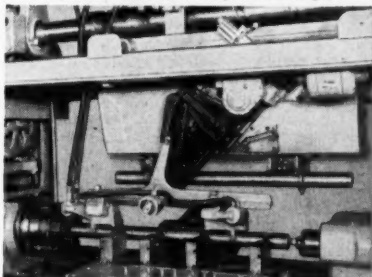
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.



Ejector Arm has picked up finished shaft. Injector Arm is tipping and lowering a rough shaft. Spindle is stopped, chuck jaws open and tailstock center retracted.



Injector Arm is now bringing rough shaft to the horizontal position for entry into chuck jaws. Ejector Arm still holds finished shaft.



Injector Arm movement completed. Rough shaft on centers, chuck jaws closed and tailstock spindle advanced. Injector Arm Fingers will next release shaft, and machining begins while Trolley discharges finished piece and returns with the next rough shaft.

PRODUCTION COSTS ARE LOWER WITH So-swingy

get
a
better
job done

with

Mor-Speed

save time

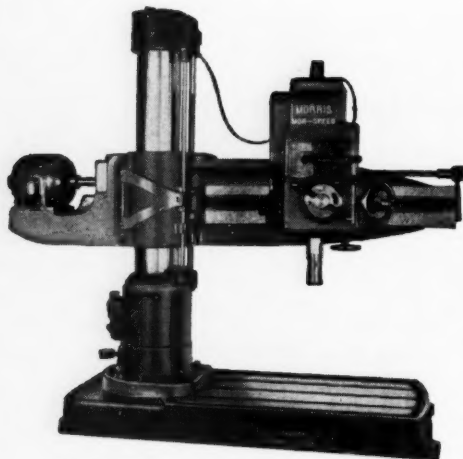
with completely centralized controls . . . instant selection of proper speed, feed; easily set automatic stops and trips.

with safety and dependability

tested safety devices
safeguard machine,
worker, workpiece . . .
automatic lubrication
protects built-in precision.

with lasting accuracy

alloy steels . . . modern
hardening . . . extra
anti-friction bearings, all
assure minimum wear
and low cost service.



9" Column Standard and Heavy Duty Models (with 3 and 4-foot arms)

11" Column Heavy Duty Model (with 3, 4, 5 and 6-foot arms)

Morris MOR-SPEED RADIALS

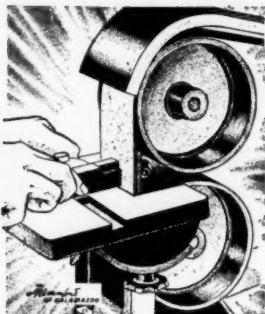
Whether for production or tooling MORRIS Mor-Speed RADIAL DRILLS give you fast, easy operation with accuracy so essential in holding down costs. Write for bulletin #59. Early deliveries available.

THE MORRIS MACHINE TOOL COMPANY
934 HARRIET ST. CINCINNATI 3, OHIO



"A Better Product at Less Cost with PRECISION PLUS PRODUCTION."

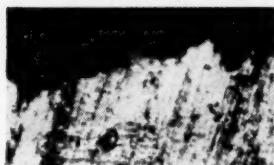
NEW 3M DISCOVERY obsoletes all other abrasive belt methods for sharpening carbide tools!



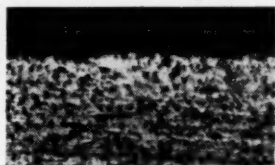
Here is a completely new machine—a completely new method—for belt sharpening tungsten carbide tools. Gives a longer-lasting, more precise edge than ever before possible without diamond wheels and highly skilled operators. Developed by 3M, designed and built by Hammond Machinery Builders, this machine uses a specially designed 3M Abrasive Belt passing over an absolutely flat carbide platen. This special work surface—hard as the tools you finish—enables you to finish every cutting surface. That means you can finish the all-important *top* of the tool, impossible with previous belt methods. All lands are restored to original *flat* planes—not hollow-ground.

Look! Micro-photographs* prove new 3M Carbide Tool Sharpening Method gives a better finish than ever before possible except on a diamond wheel!

*These photos, representing 1/100 of an inch, show the cutting edge of a single point tungsten carbide tool.



Grinding with green grit silicon carbide wheels leaves this rough jagged edge leading to premature breakdown of cutting edge—result short tool life, frequent reshaping, costly set-ups and loss of production efficiency.



Finished with 150 grit "Tri-M-ite" Resin-ite Paper Belt, after rough grinding with a 60 grit green wheel, gives this near-perfect edge. Even an unskilled operator can attain results like this! Compare this picture with the one at right...



...finished with 180 grit diamond wheel. Here is perfection—on a brand-new tool! These micro-photographs show the slight difference between the 3M-sharpened tool and this diamond-sharpened tool! Here is conclusive proof that the 3M Carbide Tool Sharpening Method comes as near perfection as it is possible to get—at only a few cents per belt!

.....
GET ALL THE FACTS FROM YOUR 3M REPRESENTATIVE about this amazing new method for sharpening carbide tools. He will be glad to give you full details!



MINNESOTA MINING & MFG. CO., Dept. MM-63, St. Paul 6, Minn.

Yes! I want to talk to a 3M Representative about the new 3M Carbide Tool Sharpening Method!

Name

Company

Address

City Zone State



Made in U.S.A. by Minnesota Mining & Mfg. Co. General Offices, St. Paul 6, Minn. In Canada: London, Ont., Can. Export 122 E. 42nd St., New York City. Makers of "Scotch" Pressure-Sensitive Tapes, "Scotch" Sound Recording Tape, "3M" Adhesives, "Underseal" Rubberized Coatings, "Scotchite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing.



...but

Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate—without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be **SAFE**, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!



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today!**

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- Universal bar and chucking equipment
- Special tools
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● You'll find this new book a real help in selecting and properly using Warner & Swasey turret lathe tools. It clearly and simply explains ways you can use modern tools to take full advantage of the increased speed and power of today's turret lathes. It's a book you won't want to be without—so send for your copy today!

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PRECISION
MACHINERY
SINCE 1898

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"Turret Lathe Tools" today!

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Company
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YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

Announcing

THE

**VAN
NORMAN**

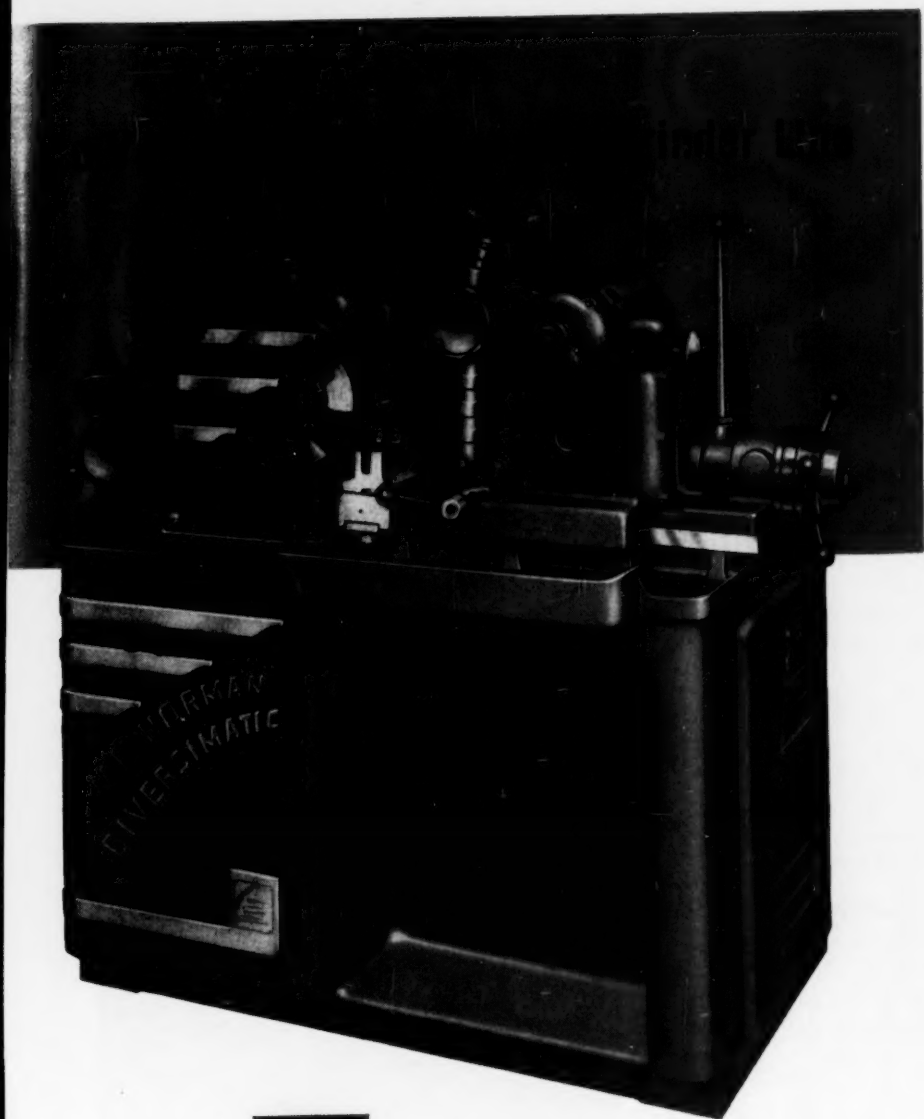
DIVERSIMATIC
**CENTERLESS
GRINDING
MACHINE**

**COMPARE THESE
OUTSTANDING VAN NORMAN
DIVERSIMATIC FEATURES**

- Special, easily removable grinding wheel, spindle quill, with combined double-row super precision ball and roller bearings, sealed and lubricated for life assure trouble-free operation
- Spindle requires no warm-up period
- Combination straight and contour grinding wheel dresser.
- Straight screw-type regulating wheel dresser
- Grinding wheel diamond constantly flushed from below with coolant during wheel dressing
- Infinitely variable $\frac{1}{4}$ h.p. regulating wheel drive, 30 to 300 r.p.m.
- Large $1\frac{1}{4}$ inch 4 thd. Acme Infeed Screw with full length split type nut to compensate for wear
- Work-Rest adjustable for position; may be fixed across the ways or made to feed in and out with the regulating wheel

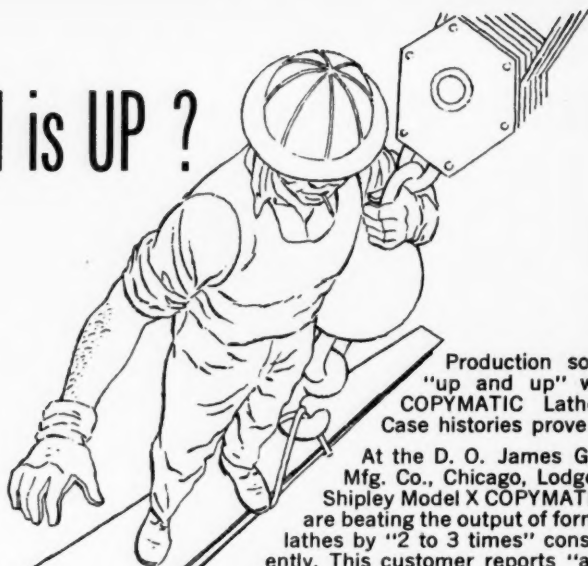
Get the full facts on the Van Norman Diversimatic Centerless Grinder. See for yourself how this versatile grinder can cut your grinding costs on small shafts, formed shapes, parts of two or more diameters or special contours.

*Van Norman Diversimatic acquired from Diversified Metal Products Co.



VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS, U. S. A.

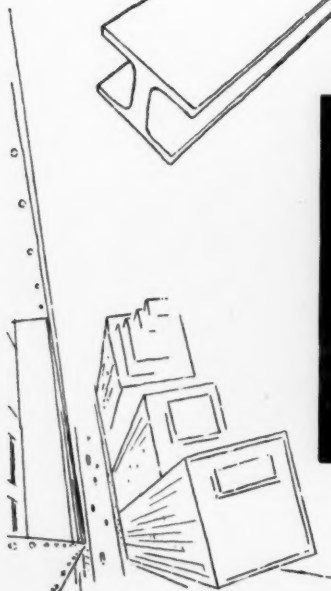
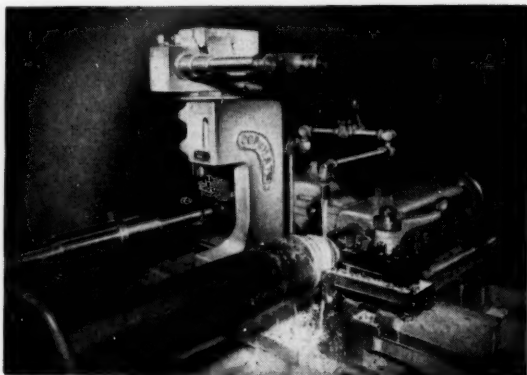
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Production soars
"up and up" with
COPYMATIC Lathes!
Case histories prove it!

At the D. O. James Gear
Mfg. Co., Chicago, Lodge &
Shipley Model X **COPYMATICS**
are beating the output of former
lathes by "2 to 3 times" consist-
ently. This customer reports "any-
thing that is turned on a standard
lathe" is produced by their **COPYMATICS**
faster and at lower cost. Time saved runs
up to 66%!

It costs nothing to submit your toughest job.
Write for literature and detailed case histories.



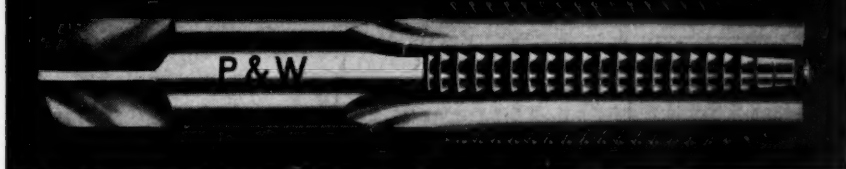
THE **Lodge & Shipley** COMPANY

3057 COLERAIN AVE. CINCINNATI 25, OHIO

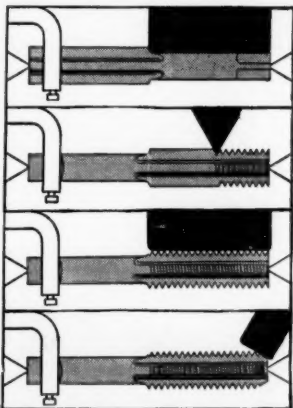


TAPS

*Always Concentric
Always Accurate*



because.. All Important Operations on Pratt & Whitney
Ground Thread Taps ARE PERFORMED ON CENTERS!



SHANKS PRECISION GROUND ON CENTERS . . .

..... the first step in insuring concentricity between the chuck and the threads on the tap itself.

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..... to insure a uniformly perfect thread form, the basis of clean, accurate threads in the finished work.

O.D.'S PRECISION GROUND ON CENTERS . . .

..... another step in maintaining necessary concentricity between shank, pitch diameter and crests of the thread.

CHAMFERS PRECISION GROUND ON CENTERS . . .

..... to guarantee equal distribution of the chip load per tooth, on each land of the tap, as well as close control of tapped hole size.

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PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY

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DIRECT FACTORY REPRESENTATION IN PRINCIPAL CITIES

MACHINE TOOLS • CUTTING TOOLS • GAGES

Which Carburizing Grade of Tubing Is Best for You?

...B&W Can Supply Them All

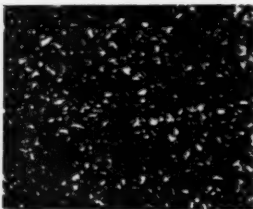
When you want to carburize for hard surface and at the same time maintain a tough core, it is wise to examine all available carburizing grades to determine which is most suitable for your specific operation. The low-carbon alloy steels listed are typical of those designed for ease of carburization.

After carburizing, the steel has a high carbon content on the surface and only the carbon content of the base alloy in the core. This provides, after suitable heat treatment, a surface which is hard and wear resistant and a core that is tough and ductile—a combination desired in many applications. Alloying elements impart an ability to develop a deeper case for a given set of carburizing conditions and provide a more gradual transition in microstructure and hardness from case to core than in a plain carbon steel.

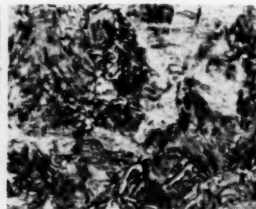
In the application of these low-carbon alloy steels it is possible, in many instances, to use alternate grades without loss of desirable mechanical properties. Discuss your requirements with Mr. Tubes—your nearby B&W Tube Representative. You'll find B&W Bulletin TDC-149 helpful, too. Write for it.

TYPICAL GRADES

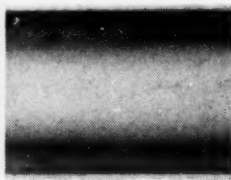
1320
2317
2515
3120
E3310
4023
4320
4620
4815
5120
6120
8620
8720
E9310



Micro at 1000X of the case



Micro at 1000X of the core



Macro of the tube wall at 5X

THE BABCOCK & WILCOX COMPANY TUBULAR PRODUCTS DIVISION

Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

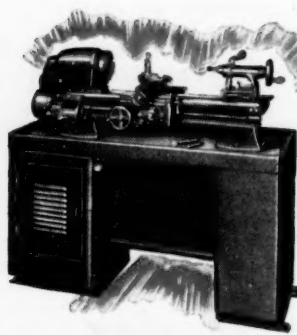


TA-1966 (81)



"Jeepers! That putter of Mac's is as accurate as a

Logan LATHE!"



Logan No. 955
QUICK CHANGE GEAR LATHE
 11" Swing, 1" Collet
 Capacity, 1 1/4" Spindle Hole

PRECISION RESULTS have made the Logan Lathe one of the world's most widely used machine tools. Logan advanced design and rugged, precise construction assure accuracy that stands up under hard daily use. Because the Logan ball bearing spindle, for example, needs no adjustment for any speed from 45 to 1500 rpm, original accuracy is preserved. The two V-ways and two flat ways of the Logan bed are precision ground to a tolerance of .0005", and are warp-free. 11" swing, 1" collet capacity and 1 1/4" spindle hole provide the capacity for a high percentage of any shop's metal turning. Remember, too, no other lathe of comparable specifications can match Logan economy.

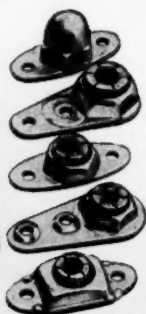
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LOGAN ENGINEERING CO.

4901 West Lawrence Avenue, Chicago 30, Illinois

**14 Benchmasters kick out
202,500 parts per day!**

...paid for themselves in 30 days!



The Nutt-Shel Company, Glendale, California, manufactures an assortment of aluminum, steel and stainless steel self-locking anchor nuts and nut and bolt retainers for the aircraft industry.

Their five-day-weekly production is 1¼ million assemblies, 90% of which is produced on Benchmaster 4-ton punch presses... proving again that for high production and year-in, year-out dependability you can't beat a Benchmaster!

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1835 W. Rosecrans Avenue, Gardena, Calif.



"doing a job"

at

*Avey**

STANDARD

TWIN WHEEL TOOL GRINDERS

* Here's what the plant manager at Avey Drilling Machine Co., Cincinnati, has to say about Standard's Twin Wheel Tool Grinder:

"Any grinder that stands the punishment that we give it here at Avey must be a good grinder. All day long, day after day, we grind Carbide tipped lathe tools including boring, cut-off forming, and other high-speed steel tools. Maintenance has been only routine. Down time . . . none. Its economy is amazing."

Why not install a Standard Twin Wheel grinder in your plant? Available in 10" and 14" wheel sizes, wet or dry. No spray or splash when wet grinding. Two operators can grind at once. Conserves floor space. Write for Bulletin TW.

standardize with . . .

the **STANDARD** electrical tool co.

2487 RIVER RD. • CINCINNATI 4 • OHIO

Avey reports these results:

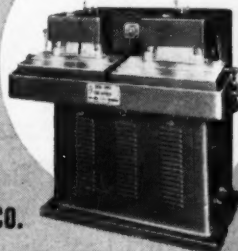
- increased production
- 30% decreased grinding time
- grinding costs way down
- less operator fatigue
- much longer wheel life

one step

from

rough to

finish grind



Patent
Pending

MCCROSKY

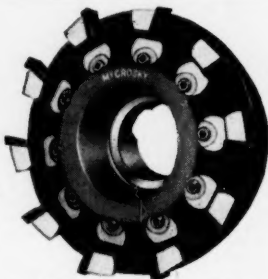
**COST
CUTTING
TOOLS**

*Super-Jack** **UNIVERSAL MILLING CUTTERS**

Just One Body for... Cast Alloy or Carbide Tips

Right Hand or Left Hand Rotation

Positive or Negative Angles



Bodies can be bladed for either right or left hand rotation. Blade shanks are locked rigidly on radial center. Consequently, simply selecting blades having tips of the proper material, mounted at the proper angle for cast iron, steel or aluminum, produces a cutter that exactly meets any material and machine requirement. Blades are easily adjusted for regrinding... and can be

* U. S. Pat. 2,547,789. Other Patents Pending

changed quickly for different work conditions.

Shell End and Face Mills in a wide range of standard sizes. Design permits building specially engineered cutters having up to 4 times as many blades as the cutter diameter,— particularly effective for finishing cuts and fine pitch higher speed, faster feed milling with carbide. Write today for Bulletin No. 531. It gives full details.

MCCROSKY Jack-Lock® MILLING CUTTERS

Complete line, fitted with high speed steel, cast alloy or carbide tipped blades. Sizes from 3" to 24" to meet any requirement. Write for Bul. 17-M.



MCCROSKY Block Type BORING BARS

Individually ground, tapered V-key centers the block and cutting blades accurately and rigidly yet permits easy release for regrinding. Write for Bul. 17-B.



MCCROSKY Super® Adjustable REAMERS

Chucking reamers with straight or tapered shanks, also shell reamers with tapered holes or large straight holes. Standard sizes from 15/16" to 6" in diameter. Write for Bulletin 18-R today.



MCCROSKY Turret TOOL POSTS

These tool posts permit tools to be swung into position quickly, indexed accurately, and locked rigidly. Four styles—11 sizes. Write for Bul. 17-T.



MCCROSKY Wizard® QUICK-CHANGE CHUCKS

McCrosky's Wizard Quick-Change Chuck and Collet outfits hold tools centered and rigid. They enable the operator to change tools without stopping or slowing down the spindle. Write for Bulletin 18-C today.



MCCROSKY Multiple Operation TOOLS

McCrosky "Specials" combine two or more boring, facing, chamfering or reaming operations into a single tool, cutting set-up time and costs. Write for Bulletin 17-S today.

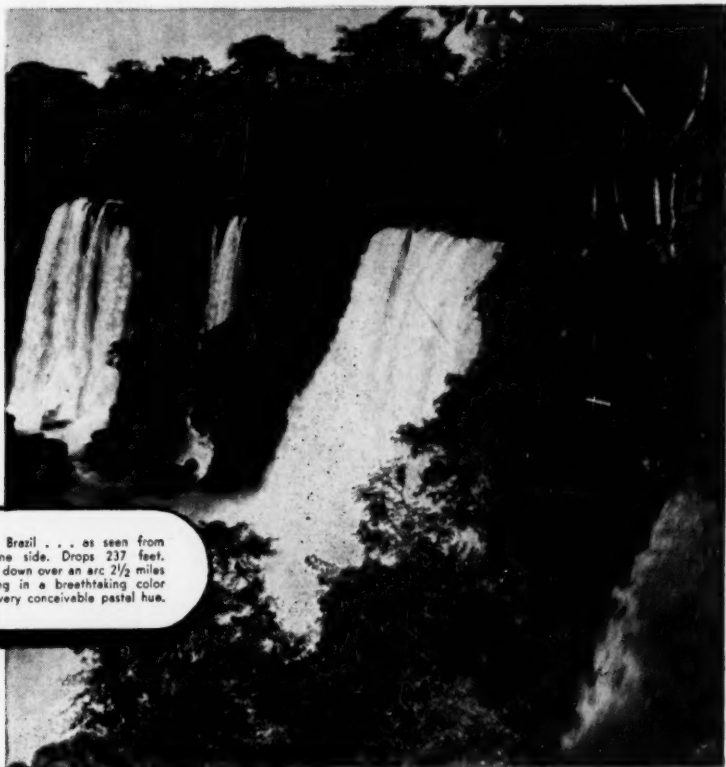


MCCROSKY

**TOOL
CORPORATION**
MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities

LOGAN FLUID POWER • DURABLE, DEPENDABLE SINCE 1916



Igussu Falls, Brazil . . . as seen from the Argentine side. Drops 237 feet. Water swirls down over an arc 2½ miles wide resulting in a breathtaking color display of every conceivable pastel hue.

LOGAN ^{AIR-DRAULIC®} FEED-CONTROLLED CYLINDERS

POWER MOVEMENTS IN ANY DIRECTION — NO POWER UNIT REQUIRED

COMBINES

the fast-acting, economical,
low pressure operation of

AIR

with the smooth, uniform
controlled regulation of

OIL

5

STANDARD
MOUNTING TYPES

Standard bores from 3" to 8".
Any stroke to 5 feet. For air
pressures to 150 p.s.i.

Furnished for controlled feed with rapid
return in either direction, or with con-
trolled feed in both directions. Stop-
feed movement can also be provided.



Air-Draulic Cylinder
with Flange Mounting
at Rod End

LOGAN MANUFACTURES 6,975 STANDARD CATALOGED ITEMS
FREE CATALOG ON REQUEST

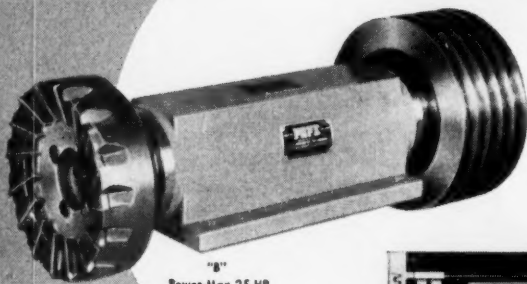
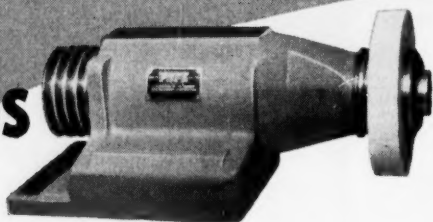


AIR CONTROL VALVES, Cat. 100-4 • AIR CHUCKS, Cat. 70-1 • AIR CYLINDERS, Cat. 100-1 • AIR-DRAULIC CYLINDERS, Cat. 100-3
AIR and HYDRAULIC PRESSES, Cat. 51 • COLLET GRIP TUBE FITTINGS, Cat. 200-5 • HYDRAULIC CONTROL VALVES, Cat. 200-4
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LOGANSPORT MACHINE CO., INC., 321 CENTER AVE., LOGANSPORT, ILL.

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HEAVY DUTY WHEEL HEADS

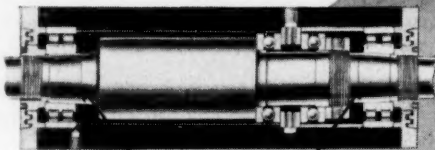


"8"
Power-Max 25 HP

Note the big precision bearings and the big shaft.

A pair of precision thrust bearings stabilize the shaft against any axial movement in either direction. (No end play)

The double row cylindrical roller bearings carry the radial loads with ease and at low temperature.



Taper mounting provides for precise individual preloading of the radial bearings.

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POPE Heavy Duty Wheel-Head Spindles are designed for a wide variety of applications such as grinding, boring, milling, drilling and many other operations requiring **PRECISION COMBINED WITH RUGGEDNESS** in the spindles.

For continuous production and trouble-free operation **THERE'S NOTHING LIKE A POPE SPINDLE WITH ROLLER BEARINGS.**

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PRECISION SPINDLES

POPE MACHINERY CORPORATION

261 RIVER STREET • HAVERTHILL, MISSOURI 64090

"Buffalo"

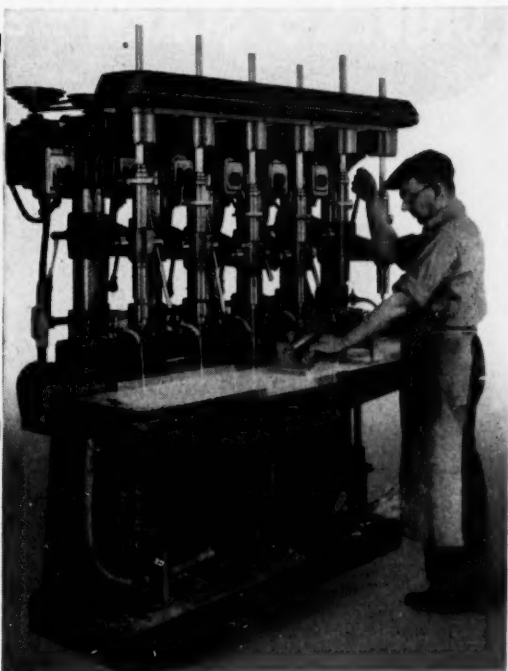
Tips on Better DRILLING

**HOW TO LET
A WORKER
TURN OUT**

**More Work
-Easier!**

Yes, sometimes it's a case of "letting" a worker step up his turnout! Sometimes an awkward, outdated machine is holding him up. Take the machinist at right. He's drilling and tapping precision parts on a "Buffalo" No. 16 Drill. The sliding heads are readily adjusted to just the right level for comfort all shift long.

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"Buffalo" No. 16 Six-Spindle Drill

BUFFALO *Forge* **COMPANY**

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DRILLING

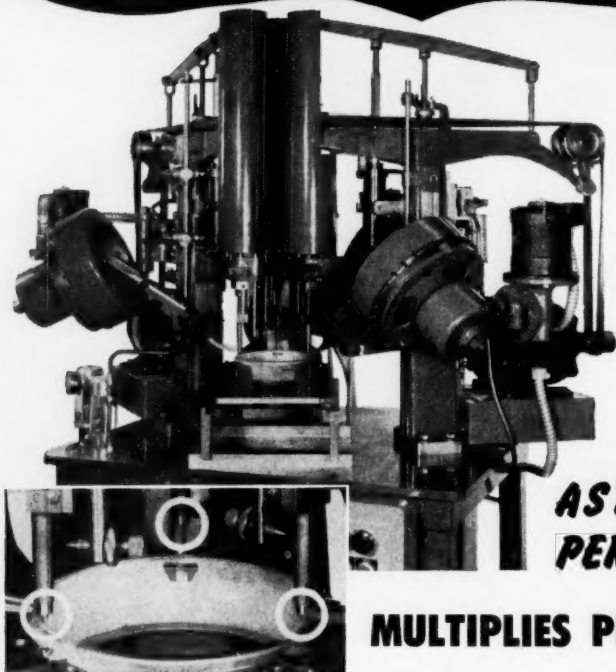
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This Remarkable "GROUP OPERATION" DRIVES 3 SCREWS at ONE TIME!



**AN
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MULTIPLIES PRODUCTION!

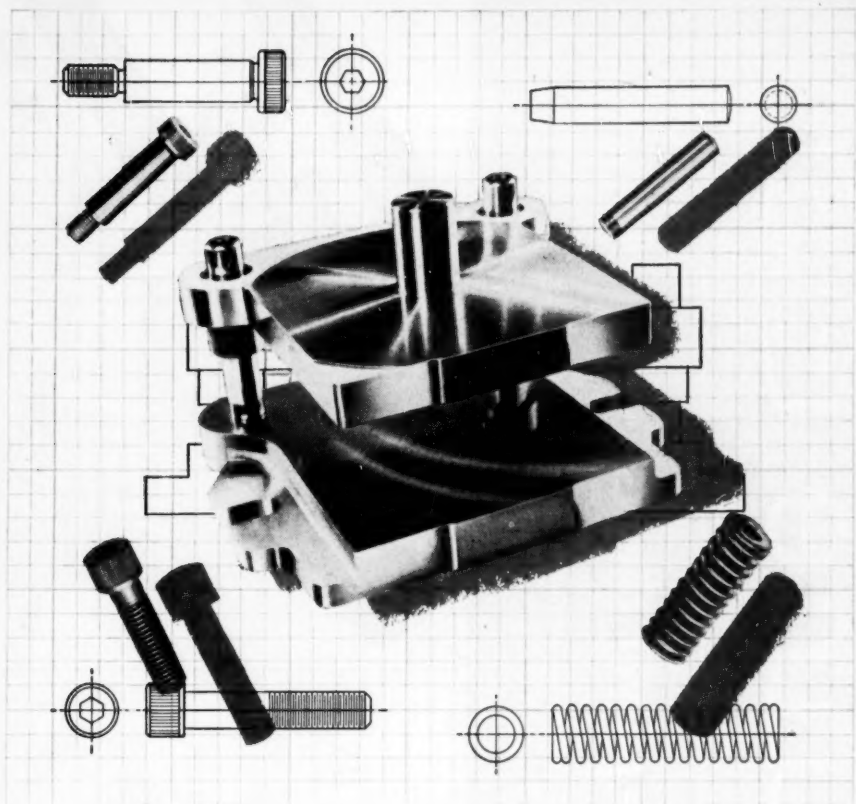
Three standard DPS SCREWDRIVING MACHINES, mounted on a common base, are feeding and driving three screws simultaneously into an automobile headlight frame as fast as one could be driven. (The three heads can be operated simultaneously or individually as desired.) Just another instance where Detroit Power Screwdrivers do the unusual.

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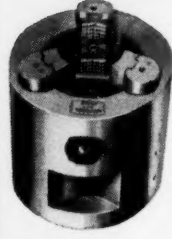
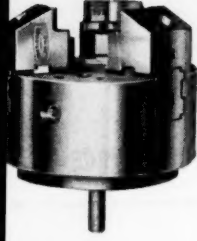
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Solid Collets and Pushers and
Master Collets, Pushers
and Pads.



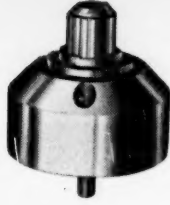
STEEL CAMS

Precision cut, flame hardened—for all models and sizes of Acme-Gridley Chucking and Bar Machines.



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POWER CHUCKS — external, internal and pot type, 2 or 3 jaw, also pads to specification or in blank forms for $5\frac{1}{4}$ to 12" capacity machines.



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...as defined by Webster, means from the original source, true, not cheapened or adulterated.

In every genuine product, certain proven advantages profit both the maker and the user—otherwise that product could not long continue to be preferred.

That's precisely the experience of a continuously growing percentage of Acme-Gridley machine owners. Those who

have tried less suitable substitutes have come back to standardize on collets, power chucks, cams, tools and parts—engineered, made and guaranteed only from this source.

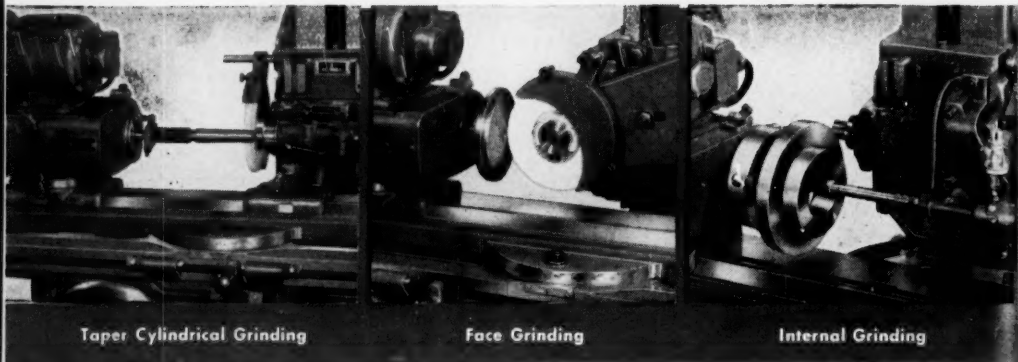
Specify genuine Acme-Gridley components and you will profit by following the leaders among the users of 45,000 Acme-Gridley Automatics.

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ACME-GRIDLEY BAR AND CHUCKING AUTOMATICS (1-4-6 AND 8 SPINDLE) • HYDRAULIC THREAD ROLLING MACHINES • AUTOMATIC THREADING DIES AND TAPS • LIMIT, MOTOR STARTER AND CONTROL STATION SWITCHES • SOLENOIDS • CONTRACT MANUFACTURING



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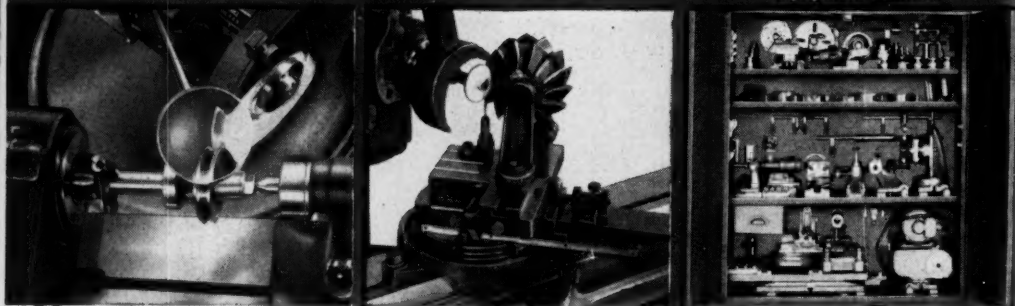
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"MASTER" of all your toolroom grinding

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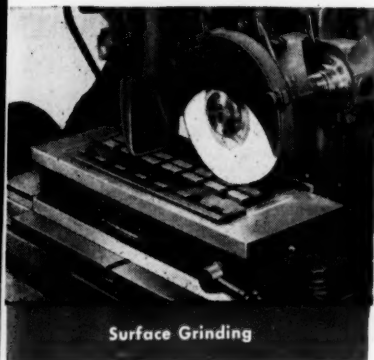


Capacity: 24" length, 8" swing

For complete information on this versatile machine, write: **Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.**

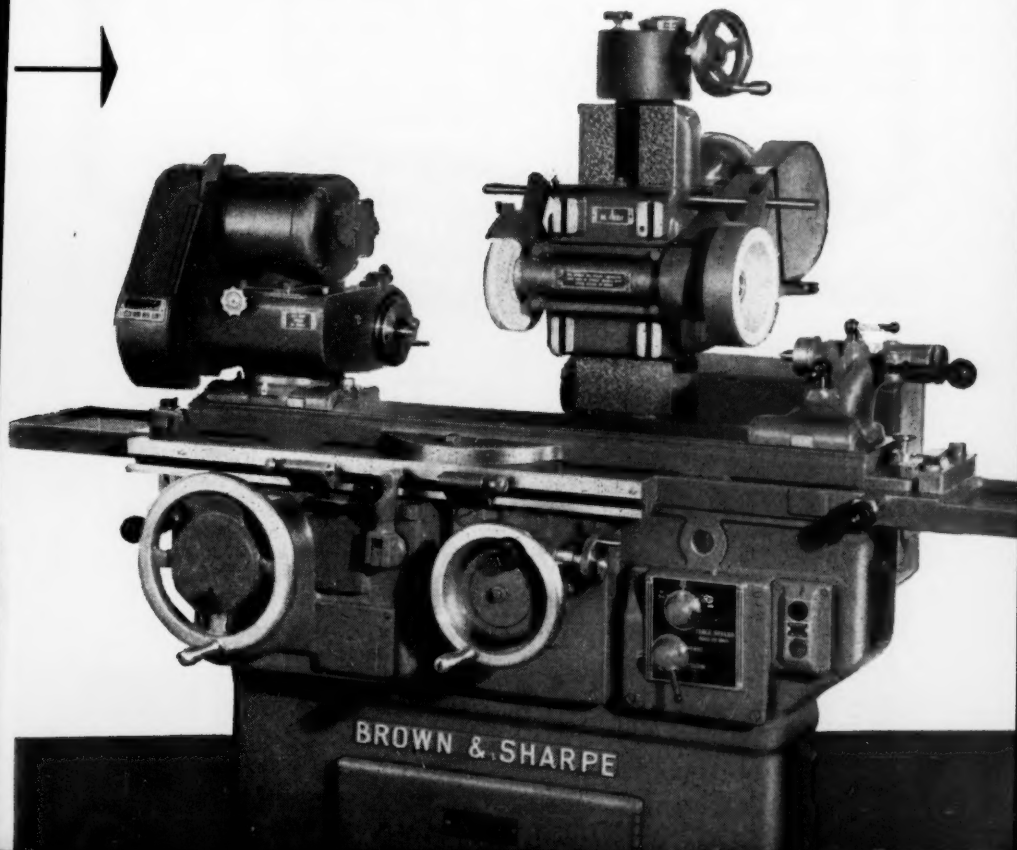
Brown & Sharpe 

The No. 13 Universal and Tool Grinding Machine



Surface Grinding

With the No. 13, you can handle the broad range of precision grinding jobs usually encountered in tool and die shops, research laboratories, and toolrooms. Outstanding among many features giving broad utility are the machine's swivel-mounted table, headstock, and spindle-slide-upright. A wide selection of optional equipment, as shown in several of the illustrations, also increases the No. 13's work capacity.





NOTE: This is the only grinder in its capacity range (longitudinal 24", transverse 8", vertical 12") with a vertical spindle grinding head.

ABRASIVE No. M-34 VERTICAL SPINDLE SURFACE GRINDER

Only one in its class!

When the job calls for fast, low cost grinding of flat surfaces, it pays to schedule the work to the Abrasive No. M-34. This toolroom-sized surface grinder puts toolroom grinding on a production basis. Its 6" segmental-type grinding wheel, driven by the full power of a 5 HP built-in motor, permits fast removal of stock

— produces ultra-fine surface finishes — maintains flatness and parallelism within very close tolerances.

It will pay you to get full details on the Abrasive No. M-34. Send for complete catalog today. Abrasive Machine Tool Co., 20 Duncellen Road, East Providence 14, Rhode Island.

ABRASIVE

ACCURACY BOOSTS PRODUCTION

Abrasive Quality is Reflected in the Finish of Your Product

hendey lathes are better built...

FOR LONGER, MORE ACCURATE LIFE!

And here's how it's done — Hendey starts with quality design and follows through with quality workmanship. Take the hardened and precision ground bed ways, for instance. Hendey does this differently *and better!* First, the world's most modern induction hardening equipment uniformly hardens the ways. Next, the precision machined legs and chip pan are attached to the bed (and they are never removed thereafter). Ultra precision grinding follows. Exacting checks for accuracy are then followed by electronic testing for hardness — uniform hardness — there are no soft spots in a Hendey bed — and a customer's test sheet proves it!

Add to this, quiet headstocks, the finest of lead screws, simplified, convenient controls and the ruggedness and power essential for modern precision turning.

Hendey lathes maintain the Hendey tradition for quality and accuracy. And there is the *right* machine in the Hendey line to suit your precision turning requirements. Write for details.

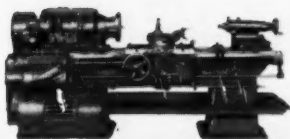


Featuring uniformly hardened and precision ground bed ways.

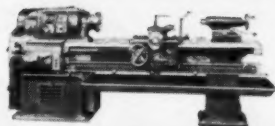


**the Hendey
machine co., inc.**
torrington, conn., u.s.a.
—precision machine tools—

distributors in principal cities



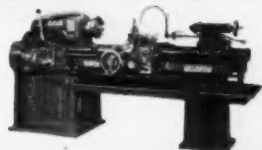
18" — 20" — 24" 12-speed Geared Head Lathes



12" — 14" — 16" 18-speed Geared Head Lathes



12" — 14" — 16" 12-speed Geared Head Lathes



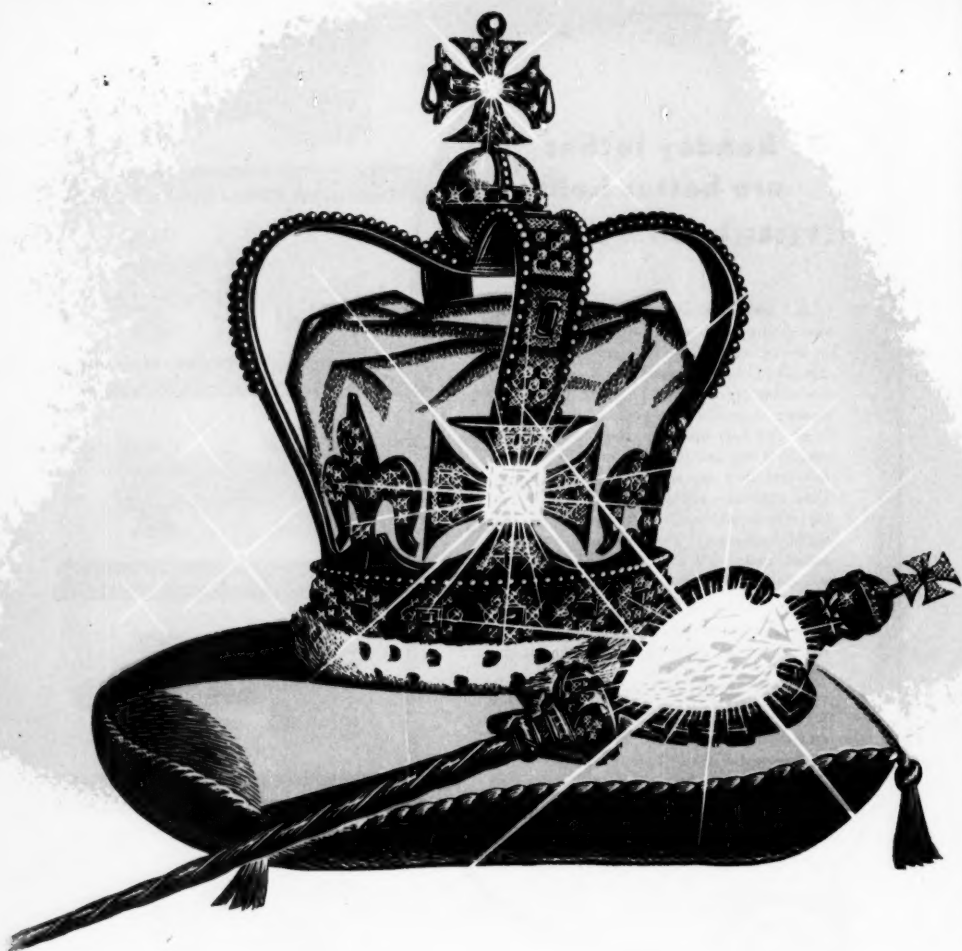
No. 2 General Purpose Lathe



No. 1 General Purpose Lathe



9" x 24" Tool & Gage-Makers' Lathe



Radius
Forming
Tools



"Tru-Line"
Profile
Dressing
Tools



Diamond
Grit Tools
for Thread
Dressing



"Tru-Thread"
Thread
Dressing
Tools



A Mountain of Light, and a Star

When the royal crown is placed upon a British monarch's head, the soft lights of Westminster Abbey dance upon some of the most beautiful jewels in existence, including two of the world's greatest diamonds—the Koh-i-noor and the Great Star of Africa.

The Koh-i-noor, or "Mountain of Light," was found four thousand years ago in the legendary diamond fields of the King of Golconda. War, conquest, torture, theft, assassination and barter brought it to princes, moguls, shahs and rajahs, and brought tragedy, too, so the legend says, except when it was worn by a woman. Originally it weighed 800 carats, but cutting has reduced it to 106½ and greatly increased its beauty. It adorns the front of the Queen's crown.

The Great Star of Africa, set into the top of the royal scepter, weighs 516½ carats and is the largest cut diamond in the world. The original stone weighed 3,025 carats (about a pound and a half) and although it was the largest diamond ever found, was, obviously, but part of a much larger stone, still undiscovered.

The Great Star was found in 1905, just five years before this company was founded, and came from Premier Mine No. 2 in South Africa, which produces many of the fine industrial diamonds which we have imported for our customers during our 43 years. Our field engineers are at your service.

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Offices in Principal U. S. Cities—Agents Throughout the World

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YOU CUT—

- **FASTER**
- **CLEANER**
- **and at Lower Cost**

STONE HIGH-SPEED CUTTING MACHINERY

LOOK AT THESE TYPICAL CUTTING TIMES

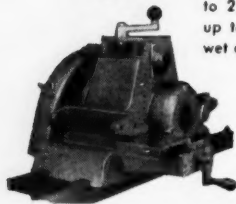
COLD ROLLED	1" Dia. Rod	3 Seconds
COLD ROLLED	1½" Dia. Rod	6 Seconds
COLD ROLLED	2½" Dia. Rod	15 Seconds
PIPE	2" Dia.	3 Seconds
ANGLE IRON	2"x2"x¼"	3 Seconds
ALUMINUM	2" Dia. Tube	3 Seconds
BRASS	1"x1" Bar	4 Seconds

**CUT ALL METALS AT LESS THAN 4 SECONDS
PER SQUARE INCH**



MODEL M-75

A floor model, 2½' x 4' equipped with full 7½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2½" — pipe and structurals up to 4". Can be equipped for wet cutting.



MODEL SS-20

Operates on guided rails for cutting larger structural steel, plate, sheet, with cuts up to nine feet in length. Cuts wet or dry.

MODEL M-14

32" x 34" Bench Model. This mighty little brute, with full 3½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2" — pipe and structurals up to 2½". Two models — straight cut-off and swivel head for angle cutting to 45°. Legs available.

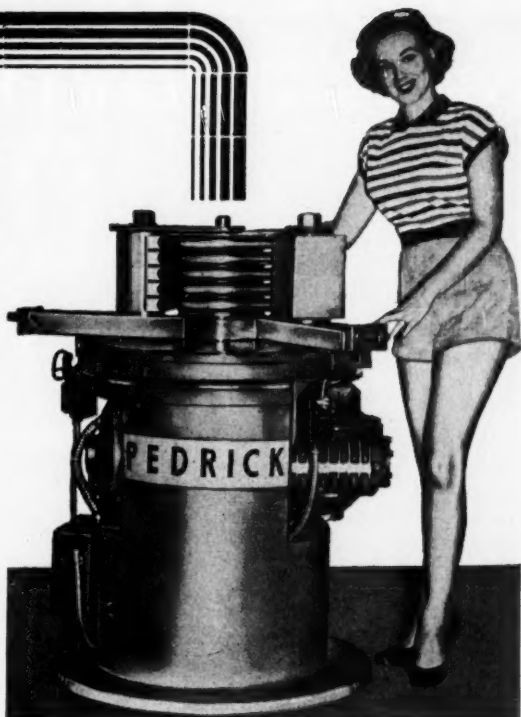


For complete information write to
STONE MACHINERY Co., Inc.
410 Fayette St., Manlius, N. Y.

MULTIPLE BENDING SAVES DOLLARS

Here is a Pedrick Production Bender producing five identical frames simultaneously. These savings can be yours too with a Pedrick Bender. Multiple bending is adaptable to almost all bending operations, including pipe, tube, reinforcing bars or structural shapes. Smaller and larger machines available.

**WRITE FOR
DESCRIPTIVE
FOLDER
DEPT. 5**



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MACHINE
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ABSOLUTE *TOLERANCE* CONTROL

When job specifications leave no leeway, when extreme tolerances must be rigidly maintained . . . that's when the built-in precision of Grand Rapids Grinders proves most valuable.

Defense commitments make it impossible for us to fill your orders as rapidly as we'd like to...but we know our customers can appreciate the reasons for delay. As always, we're doing our best to serve you.

GALLMEYER & LIVINGSTON CO.
308 Straight Ave., Grand Rapids, Mich.



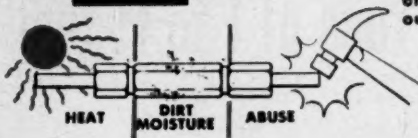
GRAND RAPIDS GRINDERS

...the very best

Manufacturers of
Surface Grinders • Cutter and Tool Grinders • Tap and Drill Grinders

MAKE GAGES LAST LONGER

DON'T



offered by Size Control Company as a service for our thousands of satisfied customers and friends.*

✗ Don't Force a gage into or over the part being checked.

✗ Don't lay gages on benches, machines or dirty surfaces.

✗ Don't clean gages in water, soluble solutions, kerosene or carbon tetrachloride—all cause rusting.

✗ Don't spin parts on or off gages. This induces rapid wear.

✗ Don't lay gages in the sunshine—expansion will cause errors.

✗ Don't use gages that fit loosely. Know the "feel" of proper gaging.

✗ Don't use gages that show visible burrs, nicks or other irregularities, and REMEMBER—reversing the plugs, end for end, and careful removal of a small segment of the leading edge when it becomes worn will provide up to six times longer useful life!

We'd like to discuss your gage needs and have your gage orders. Our engineering representatives are located in all principal cities. Write or telephone us

8 1/4 x 11" reprints of this ad in three colors on heavy stock are available at no charge for posting in your factory.

DO



✓ Learn how to properly hold and use your gages. Fit must be snug and smooth. Make wooden, felt covered gage racks. Oil the felt surface. This helps to keep your gages clean.

✓ Roll or twist the gages into the work slowly to get the proper feel.

✓ Check every gage against the master gages before using, at least once on every shift and before returning to the tool crib.

✓ Include gaging expense as part of manufacturing budget. Quality product companies now do this.

... AND insist on all of these quality features when you buy new gages:

• Reversible Plugs... enable you to cut off worn tips at each end—use new section exposed for six to eight times more wear life.

• Entire Plug Surface Usable—straight untapered pieces provide uniform gaging surface over entire length—finish to 1.5 micro-inches RMS or less for maximum amount of wear life.

• Pin-Vise Aluminum Handle—positive locking; plugs can't slip. Easily loosened for replacing or reversing plug. Plug length adjustable for different hole depths.

• Easy Recognition—GO in green finish; NO GO red.

• Special Hardening—plugs hardened throughout... enables you to grind down to smaller size... gives greater economy.

SIZE CONTROL COMPANY

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Division of American Gage & Machine Company

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**"200,000 – where we could
only get runs of 1 to 15,000!"**

says JOHN J. FUSCO, Consulting Engineer
NEW HAVEN CLOCK CO., New Haven, Conn.

**PIVOT HIGH
SPEED
STEEL PUNCHES**
STRAIGHTGROUND • WHIPSLEEVED

increase production 1200%!



● Piercing .065 SAE 1010 Steel-Rockwell 45-55 commercial finish with seven .053 holes resulted in broken punches at 1 to 15,000 pieces — at New Haven Clock Co.

Mr. Fusco, who has had 39 years experience in tool and die manufacturing, says: "We are now using Pivot Straightground Whipsleeved Punches and are getting runs of 200,000. We have not had a broken punch and they have held their size"

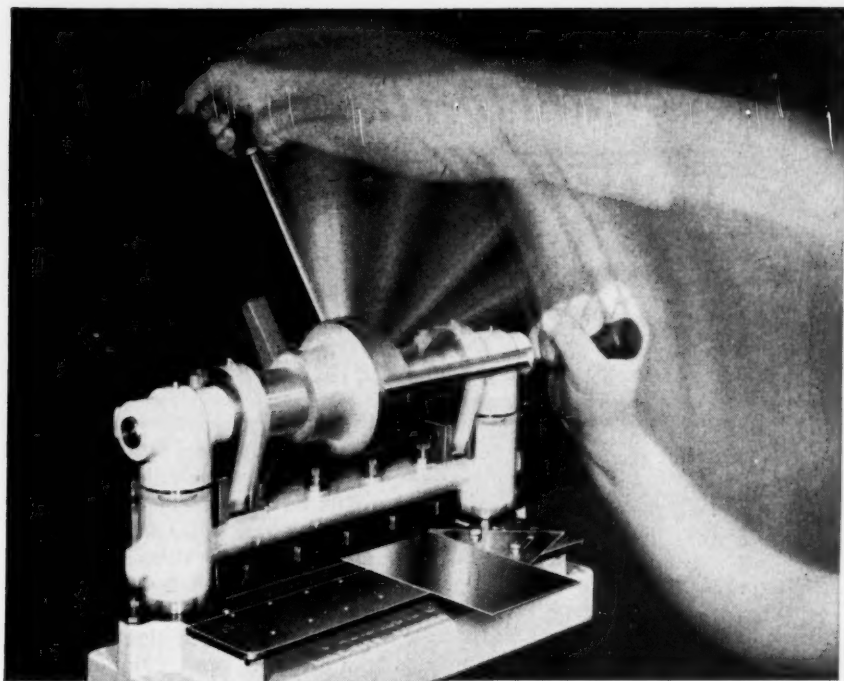
"Pivot Punches cost us about one-half the price of our own and we have realized savings of from \$75.00 to \$150.00 per month on maintenance."

● Users of Pivot Punches everywhere report longer punch life, more punching power, greater accuracy and higher production at lower costs. Get these advantages for yourself.

SEND for large FREE catalog and standard prices TODAY. Write dept. M.M.

pivot punch and die corp.

NORTH TONAWANDA, N. Y.



Want **HIGH SPEED PRECISION SHEARING?**

Check These Features and You'll want a Versatile DI-ACRO* SHEAR

- **PRECISION**—strips less than .025" wide accurately sheared and duplicated.
- **CUTTING SPEED**—rivals power machines.
- **RATED CAPACITY**—16 gauge steel.
- **EASY TO OPERATE**—a woman can operate it with minimum effort.
- **CHOICE OF MODELS**—available in four sizes. Widths from 6 to 24 inches. Four power models.
- **ENGINEERING SERVICE**—always available.
- **PORTABLE**—readily moved about.
- **RUGGED**—backed by year warranty.
- **DELIVERY**—immediate on most models.
- **COST**—that's good too.



LIKE MORE INFORMATION? Send for 32-page catalog

Gives full details on both hand and power operated Di-Acro Shears, Benders, Brakes, Notchers, Punch Presses, Rod Parters and Rollers. Write now.

*pronounced Die-ack-ro

Creators of "DIE-LESS DUPLICATING"

O'NEIL-IRWIN MFG. COMPANY, 306 8th Ave., Lake City, Minn.





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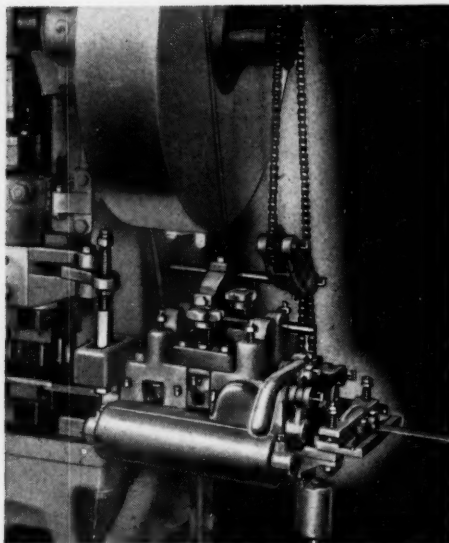
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from your PUNCH PRESSES

IT'S EASY WITH

WITTEK

Automatic Roll Feeds



Step up production by making your punch presses automatic! Wittek automatic roll feeds fit all makes and sizes of punch presses — provide maximum efficiency and extreme accuracy in the high-speed automatic feeding of strip stock. They are made in single roll, double roll, and compound types with straighteners, in models to feed (push or pull) in any of four directions. Length of feed is quickly and easily adjusted to meet individual job requirements.



4404

WITTEK Reel Stands

Simplify Handling of Coiled Stock

A choice of standard models is available to facilitate handling a large variety of coiled stock...from small, light coils to those weighing up to 800 pounds. These larger reel stands automatically center the coils and provide frictional braking action to prevent overrunning and maintain uniform coil slack.

Write for full particulars

WITTEK Manufacturing Co.

4322 W. 24th Place, Chicago 23, Illinois

Automatic

ROLL FEEDS AND
REEL STANDS



The fable of



The Three Brothers

**HOLDS A LESSON
FOR CUTTING FLUID USERS**

The Fable

THREE brothers inherited equal shares of their father's farm. One brother feverishly worked his land, with seldom a rest, until prematurely worn out, he died at an early age. The second brother loafed and played until his land went to ruin and he died for want of food. The third brother, wiser than the other two, balanced his work and play, so that he prospered mightily and lived to a ripe old age.

The Lesson

BALANCING the chemical activity of cutting fluids produces best results, too.

Figure 1 shows abnormal front clearance wear of a single point tool due to excessive chemical activity of the cutting fluid used. The tool failed prematurely, just like the first brother in the fable.

Figure 2 shows abnormal cratering of a tool due to insufficient chemical activity of the cutting fluid used. Such cratering is usually associated with poor surface finish. This tool failed prematurely like the indolent brother in the fable.

The proper balance of chemical activity gives the most profitable results. For the right cutting fluids for your work, ask to have your Stuart Oil Representative call, or write:

D.A. Stuart Oil co.
EST. 1865 LIMITED

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS

2741-47 S. Troy St., Chicago 23, Ill.

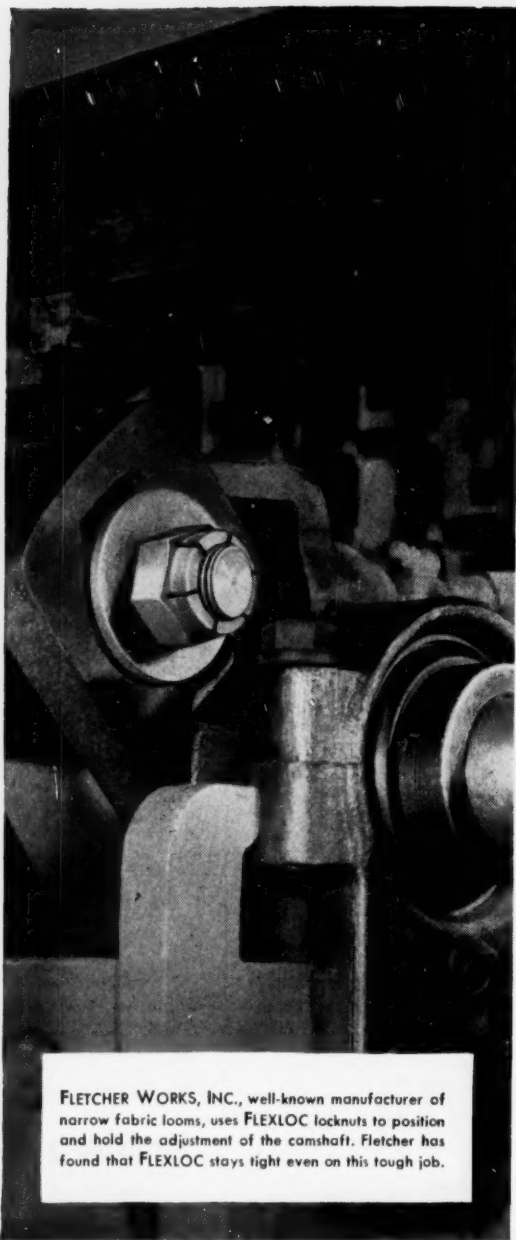


FIG. 1 — Abnormal front clearance wear caused by excessive chemical activity of cutting fluid.

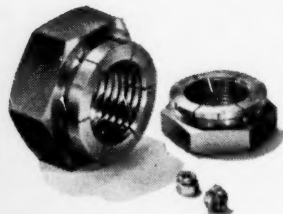


FIG. 2 — Cratering of cutting tool, usually associated with poor finish, resulting from insufficient chemical activity of cutting fluid used.

More Than a
"Coolant"
Is Needed



FLETCHER WORKS, INC., well-known manufacturer of narrow fabric looms, uses FLEXLOC locknuts to position and hold the adjustment of the camshaft. Fletcher has found that FLEXLOC stays tight even on this tough job.



How FLEXLOC locknuts reduce breakdowns

FLEXLOCS reduce breakdowns by staying put. Once installed, you can forget them.

FLEXLOCS eliminate complicated, time-consuming methods of locking threaded fasteners. They offer simpler application, more dependable locking than plain nuts and lockwashers, castle nuts and cotter pins, or nuts and jam nuts.

Use FLEXLOCS in place of ordinary nuts. These one piece, all metal locknuts won't work loose. Yet they can be used again and again. FLEXLOCS are stop nuts too. They stay put anywhere on a bolt as soon as their locking threads are fully engaged.

You can get FLEXLOCS in a wide range of sizes in any quantity. Stocked by leading industrial distributors. Write for literature and samples for test purposes. SPS, Jenkintown 22, Pa.

FLEXLOC

LOCKNUT DIVISION

SPS

JENKINTOWN PENNSYLVANIA

Our Fiftieth Year: A START FOR THE FUTURE

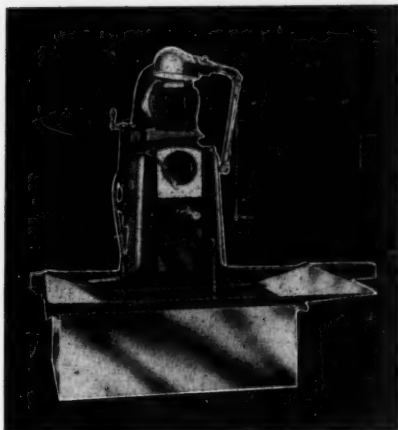


Here's why they're switching to the
SUPERIOR HONING MACHINE

• There IS a difference in honing machines. Superior gives you all the features you want. It's the most versatile and economical bench-type honing machine made. For instance, how many spindle speeds would you like? The Superior gives you infinitely variable speeds from 400 to 1000 r.p.m. AND without changing belts. Talk about ease and speed of changing mandrels and stones—no tools are needed! All stones are ground to size.

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MODEL "J"

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Please send free catalog on Superior Honing Machines.

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Load, engage feed there is to it with

HERE ARE THE JOB FACTS

Co.: Aeroaffiliates, Inc., Fort Worth, Tex.

Machine: 10 hp, No. 3 Model CH Vertical Milling Machine.

Depth of cut: 2 inches.

Feed rate: 6 3/4 ipm.

Cutter: 4-lip HSS 1 1/4 inch end mill.

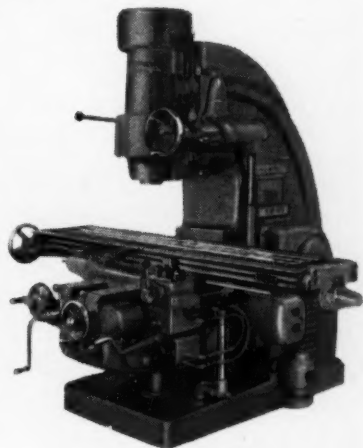
and unload—that's all this **CH** miller!

CH Vertical Milling Machine with Mono-Lever and Automatic Cycle Table Control, speeds milling of aircraft parts and reduces operator fatigue!

TO finish-mill aluminum vertical beam fittings, this manufacturer put production on an almost automatic basis without sacrificing accuracy. He's handling the job on a 10 hp. No. 3 CH Vertical Milling Machine equipped with Mono-Lever and Automatic Cycle Table Control.

Now, after the original setup, all the operator does is load the machine, engage the feed and unload. Production is up, accuracy is maintained and operating conditions have been greatly improved to the reduction in operator fatigue.

See how you, too, can cut costs, increase productivity, improve safety, get better finished products. Contact our representative or write Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.



**10 hp, No. 3 Model CH
Vertical Milling Machine**

CH Milling Machine features that helped increase output — cut cost per piece



Greater Operating Convenience through Mono-Lever control facility (optional at extra cost) for table feed and rapid traverse.



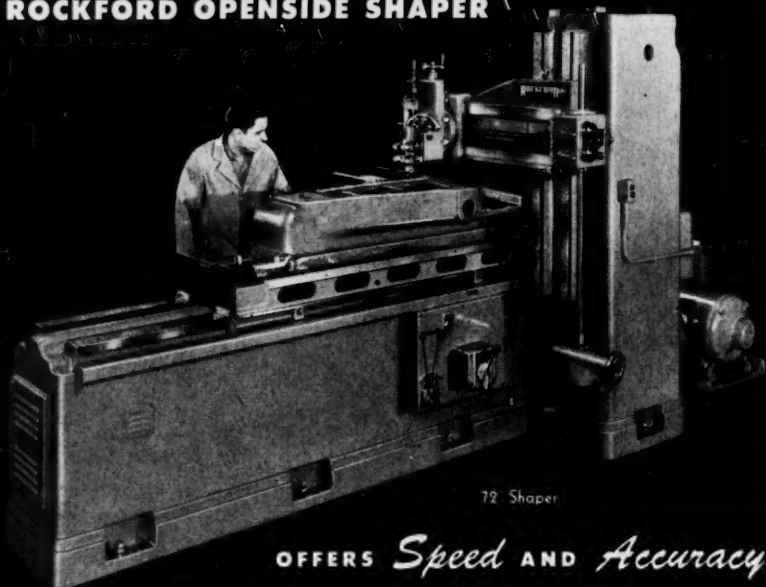
Greater Cutting Efficiency through spindle-mounted flywheel, (optional on CH Models) running with three bearing support.



Smooother Feed Performance through large dia. heavy-duty table feed screw that affords greater bearing contact, runs through extra-long table feed nut. All models are equipped with backlash eliminator.

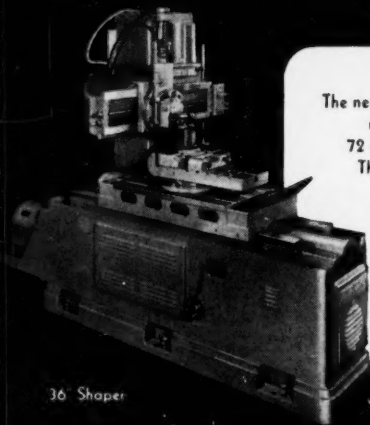


NEW.....
ROCKFORD OPENSIDE SHAPER



72 Shaper

OFFERS *Speed AND Accuracy*
PLUS *Versatility*



36 Shaper

The new 72" Rockford Openside Shaper gives you best results on all shaper jobs — with stroke lengths up to 72 inches.

This "big brother" of the Rockford Openside Shaper family (36", 48", 60", 72") has all the superior features of companion models, plus increased capacity. It's the maximum in versatility — large-job capacity with no sacrifice in speed or accuracy. And it's Hydraulic... of course.

Before you invest, investigate the new 72" Rockford Openside.

Hy-Draulic

ROCKFORD MACHINE TOOL CO.
2500 Kishwaukee Street • Rockford, Illinois

Long On Efficiency . . .
Long On Accuracy . . .
Long Life . . .

OLIVER DIE MAKING MACHINES

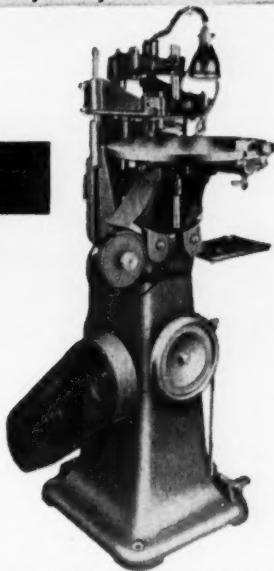


The Oliver Method of machine sawing, filing and lapping can save you time and headaches by increasing the efficiency of your toolroom.



best for making dies

Oliver Die Makers have been cutting costs for 40 years, saving toolrooms up to 60% and better in time and expense over hand methods of making dies. In thousands of plants throughout the world Oliver Die Makers are meeting production demands, giving long-lasting service (many Olivers have been in continuous use for more than 30 years), speedily, accurately, dependably. Skilled labor is not required on an Oliver due to the simplicity of operation. Modernize your die making methods the cost-cutting Oliver Way . . . Be Wise, OLIVERize.



Oliver Die Makers available in 5 models —

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

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OLIVER DIE MAKERS

See our catalog in Sweet's Directory

MACHINE TOOLS by OLIVER include:

AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
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DIE MAKING MACHINES

OLIVER INSTRUMENT CO.

1430 E. MAUMEE • ADRIAN, MICHIGAN

Having trouble with class 3 and 4 threads?



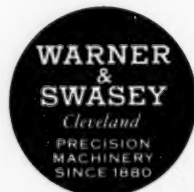
PRECISION TAPPING AND THREADING MACHINES

No. 10	0-80 to 10-24 Capacity
No. 11, No. 11-R	8-36 to 7/8" Capacity
No. 12	3/8" to 2 1/2" Capacity

HERE'S YOUR ANSWER. Hundreds of plants have drastically cut scrap losses and speeded production with Warner & Swasey Precision Tapping and Threading Machines.

These machines are designed and built specifically for precision tapping of Class 3 and 4 threads in production quantities. By Warner & Swasey's positive leading-on principle, solenoid-actuated guide fingers engage the lead screw to lead the tap in and out of the work. This exclusive feature reproduces the accuracy of the tap itself, eliminates thread inaccuracies caused by drag or backlash. Depth accuracy can be controlled to within 1/10th revolution of the tap.

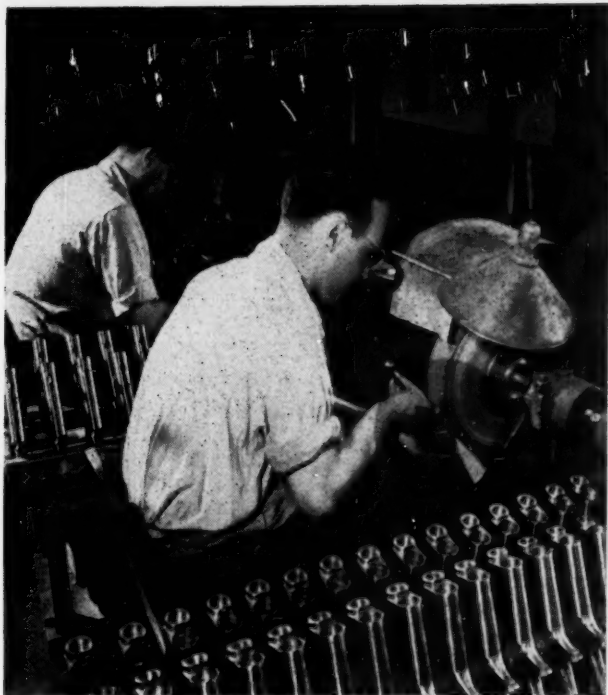
If your schedules demand precision tapping on a production scale, call in our Field Representative and have him show you how you can speed your production and reduce scrap losses with a Warner & Swasey.



YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

Gun-Polishing

with Norton ALUNDUM abrasive. This man has the "Touch of Gold." His work is fast and low in cost. Uniform-sized grain means better results and longer life.



**Polish
with the**

“TOUCH OF GOLD”

Every grain of Norton ALUNDUM* polishing abrasive does its full quota of work! That's one reason your operators get the "Touch of Gold" that adds to the quality of your product — and increases your profit margin, too.

You get better polishing at lower cost with Norton ALUNDUM because each grain is identical with the next . . . hard, tough, long-lived and exact as to size and shape. ALUNDUM abrasive adheres tightly to the wheel until all its work is done. This assures maximum life and greatest efficiency for you.

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need. He is backed by complete stocks in key cities and by the specialized experience of Norton field engineers. Distributors in all principal cities. Or you can write NORTON COMPANY, Worcester 6, Mass.

Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.



Making better products to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

G-257

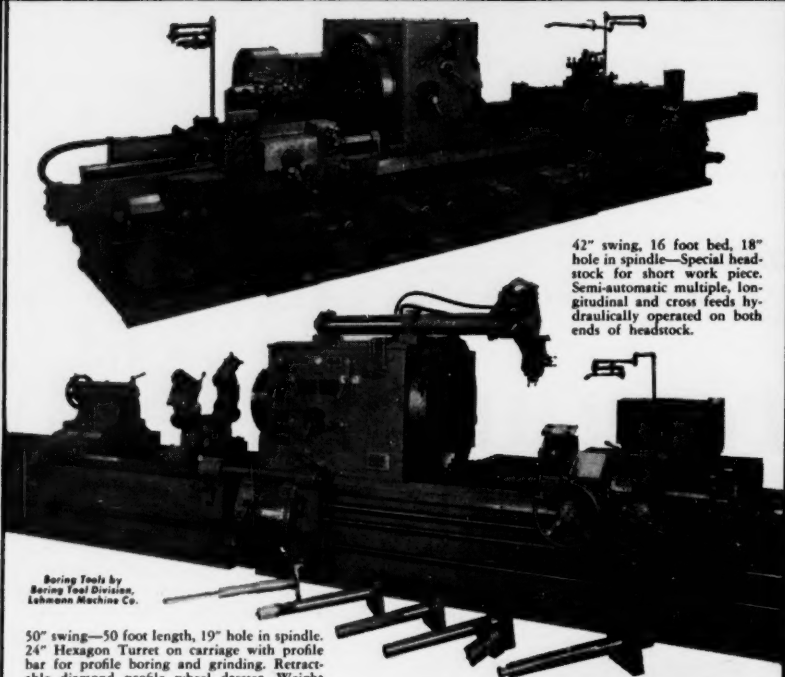
June, 1953

MODERN MACHINE SHOP 65

DOUBLE **LARGE HOLE** ENDER

LEHMANN *Hydratrol* LATHES

LARGE HOLLOW SPINDLE — DOUBLE END TYPE



Boring Tools by
Boring Tool Division,
Lehmann Machine Co.

50" swing—50 foot length, 19" hole in spindle.
24" Hexagon Turret on carriage with profile
bar for profile boring and grinding. Retractable
diamond profile wheel dresser. Weight
72,000 lbs.

Double End Hydratrol Lathes are built in sizes
from 18" with holes up to 7½" to larger sizes
with holes to suit the job. Double End operations
avoid necessity for resetting the work,
and insure relative concentricity of boring and
turning operations and squareness of faces
at both ends.

42" swing, 16 foot bed, 18"
hole in spindle—Special head-
stock for short work piece.
Semi-automatic multiple, lon-
gitudinal and cross feeds hy-
draulically operated on both
ends of headstock.

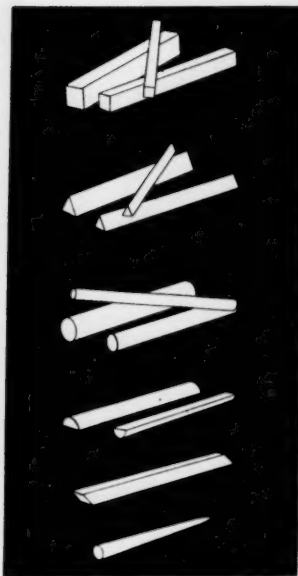
Lehmann Machine Co.

DIVISION OF NOVO ENGINE CO.

CHOUTEAU AT GRAND

ST. LOUIS 3, MO.

Once
over
lightly!



INDIA® AND HARD ARKANSAS® OILSTONE FILES

It takes a keen file to "shave the stubble" off the teeth of this massive reduction gear. An INDIA Oilstone does the job quickly and accurately. Master machinists, tool and die makers use INDIA Oilstones for deburring, radiusing, and chamfering and all other work requiring exceptionally close tolerances. There's a size and shape for every job in coarse, medium, and fine grits. Then for super-fine finishes, specify HARD ARKANSAS Oilstone Files.

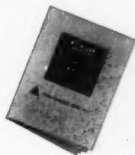
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get Catalog #19, a handy, illustrated reference for the entire line. Address Behr-Manning Corp., Troy, N. Y., Dept. MS-6.

In Canada: Behr-Manning (Canada) Ltd., Brantford.

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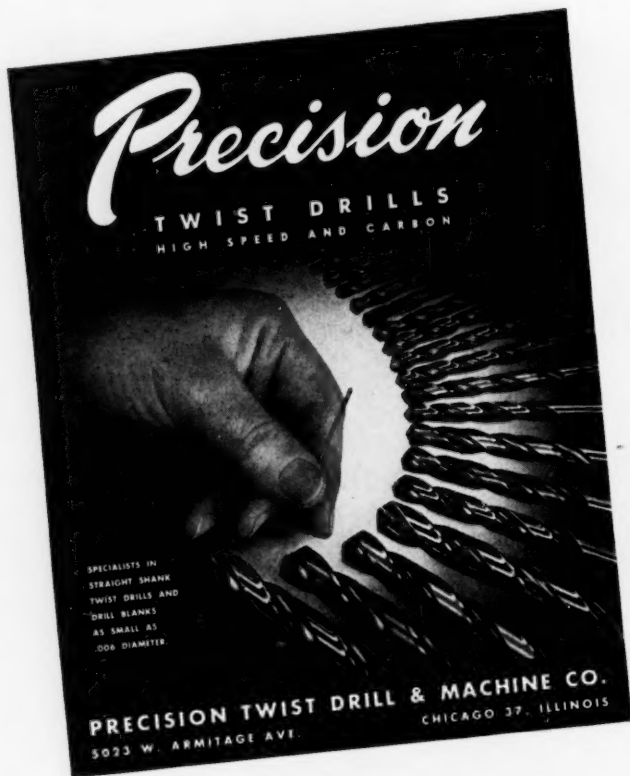
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CORPORATION

division of NORTON Company

- ▲ COATED ABRASIVES
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For the Finest Small Twist Drills



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THIS IS OUR GUARANTEE!

"Any Precision made drill or tool must not only be entirely satisfactory to you, but must prove to be the most economical you have ever used or it can be returned for full credit."

Some Desirable Territories Open for Distribution

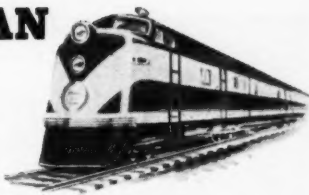
PRECISION TWIST DRILL & MACHINE CO.

5023 W. ARMITAGE AVE.

CHICAGO 37, ILLINOIS

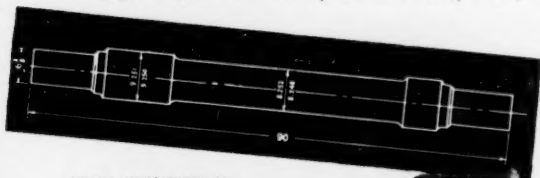
Turchan and **AMERICAN**

provide the answer to
lower costs in railroad shops



Only 1½ hours ... instead of 8 hours
to completely finish turn this Diesel axle

Six and one-half hours saved in machining this locomotive axle from the rough forging—a typical example of spectacular time savings being realized in many up-to-date railroad shops. The 25" American Lathe on which this job was done is equipped with Turchan Tracer-Controlled Hydraulic Duplicating equipment. This combination provides automation that requires no highly skilled help, no costly form tools, maintains close tolerances at increased speeds, minimum job handling. Net result: a new era in production efficiency for any metalworking plant.



OLDEST MANUFACTURER OF
AUTOMATIC TRACER-CONTROLLED EQUIPMENT

Automatize now—with Turchan! Produce better work, faster, at lower cost. There is Turchan automatic tracer control equipment for any make or size standard or special machine tools.

A black and white photograph of a man in a light-colored shirt operating a large industrial lathe. The machine is complex, with various gears, levers, and a large rotating wheel. The man is leaning over the machine, focused on his work.

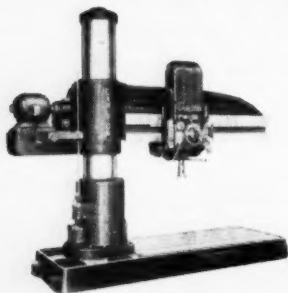
GET AN ESTIMATE
Overcome your shortage of skilled manpower—send a sketch and specifications of any job for an estimate.

Turchan FOLLOWER MACHINE CO.
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THE AMERICAN TOOL WORKS CO.
PINDINNATALLIS & CO.

Only **ONE**
can be called
the Finest:
Carlton

... here's another good reason why: **low maintenance cost**



CARLTON RADIAL DRILLS cost less to maintain because they are *designed for less maintenance attention*. For example: there's only *one* friction clutch to adjust. There are *no* tapered gibs to adjust because the head travels across the arm on hardened steel ways. Automatic lubrication throughout eliminates the damage and unnecessary wear that occurs in ordinary radial drills.

COMPARE CARLTON AND YOU'LL BUY CARLTON. Judge for yourself why Carlton radial drills are the first choice of American industry. Write for bulletins. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

OSBORN



BEFORE: Closeup of helical gear before deburring.

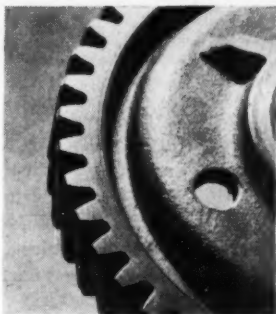
Gone . . . costly thorns in their side

Burr removal by muscle methods is aggravating because it is costly, inefficient and non-uniform in quality. Here's how a truck manufacturer has banished these "thorns in the side" with push-button brushing.

The operation: to deburr, break and blend the flank edges of gear teeth prior to shaving and heat treating. Formerly done with a hand tool, in several operations, the work was tedious and required close inspection and reworking to meet rigid specifications.

Now, an Osborn Brushing Machine in one speedy operation smooths the entire tooth edge . . . produces *uniform blending* of surface junctures of *every tooth*. Result: lower costs and greater precision for *better performance* of the product in service.

Find out how *you* can cut your costs and improve *your* products with power brushing. Call the nearby **Osborn Brushing Analyst** or write **The Osborn Manufacturing Company, Dept. M-3, 5401 Hamilton Avenue, Cleveland 14, Ohio.**

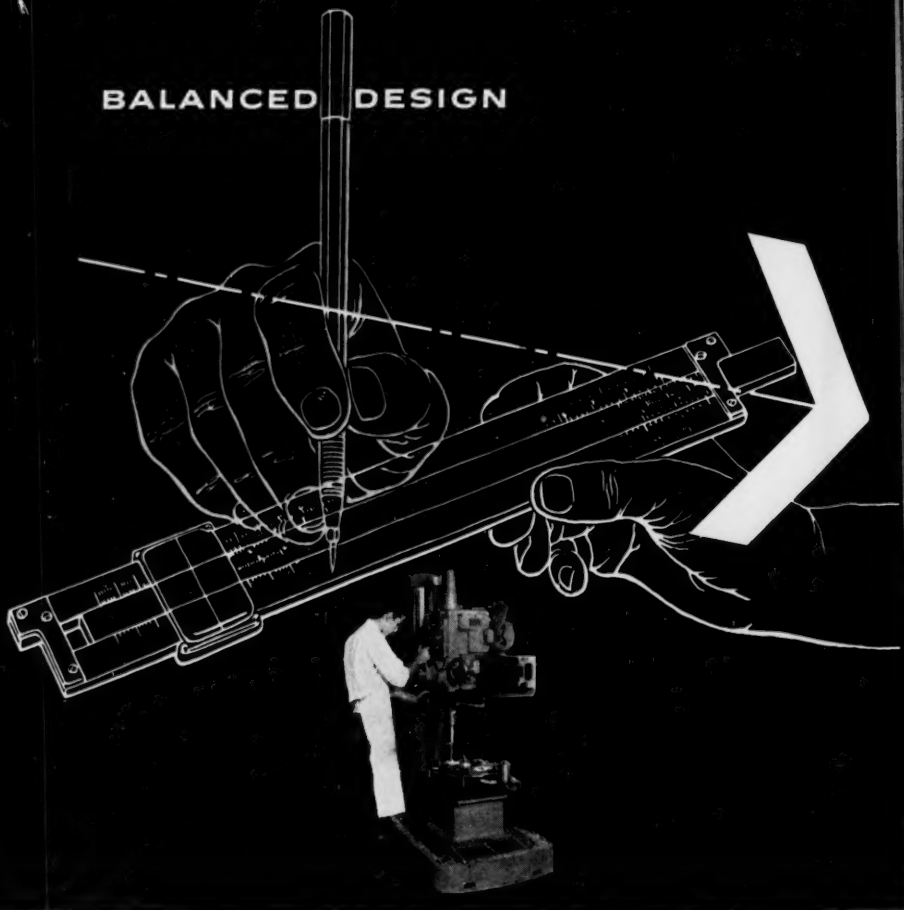


AFTER deburring with Osborn Brushing Machine.

Osborn Brushes 

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

BALANCED DESIGN



We're getting reports from all over the country on how operators really like the new 3' Arm 7" Column Radial Cintidrill. The smooth way it "handles" . . . the wide range of jobs within its 1-inch capacity . . . its round-the-clock reliability—can all be summed up as **BALANCED DESIGN**. It'll be worth a check right soon on how this new economy-priced radial can smooth out drilling schedules and save money for you.

best buys in their class!

CINTIDRILL

MORE QUALITY FEATURES

Unit construction throughout

Anti-friction bearings throughout

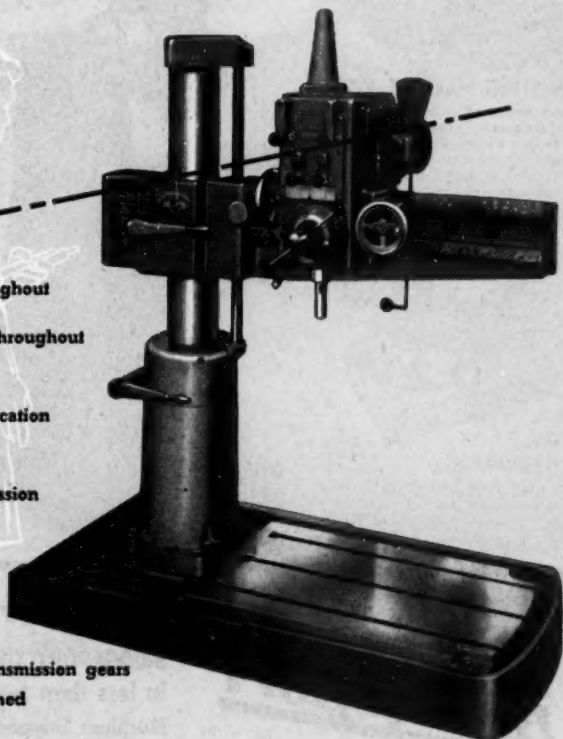
All geared head
with automatic lubrication

9 spindle speeds
in geometric progression
30 to 1 overall ratio

6 power feeds

Simple direct drive

All speed and feed transmission gears
of alloy steel, hardened

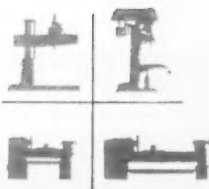



This cost-saving radial is just one of the complete balanced line of Cintidrills, including 21" sliding head box and round column floor drills; 14" 3000 and 16" 3000 sliding head bench and floor drills; 16" and 18" Royal Cintidrills, bench and floor models, single and multiple spindles. Write for catalogs and name of your nearest dealer.



best buys in their class!
CINTIDRILL

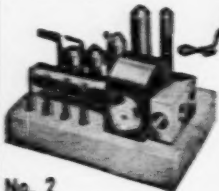
CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO, U. S. A.





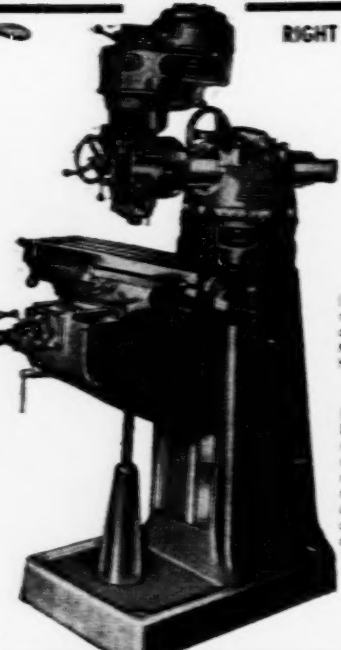
MILLING MACHINE VISE

An improved vise that provides greater gripping power, is streamlined for appearance and incorporates a cast iron trough. A large diameter screw assures rigid holding. Made in two sizes: 5"x2 1/2" and 6"x3" (see drawings).




No. 2 BORING HEAD


Boring Tools and Holder provide a means for boring holes up to 6" diameter. Available for use on BRIDGEPORT 1 HP Milling, Drilling and Boring Attachments.



RIGHT ANGLE ATTACHMENTS



(Above) Means Down Attachment for milling and drilling at right angles. Fits both Water and 1 HP Bridgeport Heads.



(Right) Light Down Attachment . . . designed for right angle milling and drilling narrow deep molds and cavities.

Note the acceptance record of

Bridgeport

BRIDGEPORT TURRET MILLING MACHINES
in less than two years . . . and WHY
Machines Shipped as of July, 1951. 13739
Machines Shipped to date. 17801

Several factors can be cited as reasons for the phenomenal acceptance and popularity of "BRIDGEPORTS":

... they meet universal demands from ALL classes of metal working . . . die shops, tool rooms and production lines.

... their versatility, convenience, speed and economy make them of outstanding utility on a wide range of work. They can be kept busy productively assuring maximum hours of profitable service.

... attachments available (some of which are shown here) extend their utility still further.

... low first cost places "BRIDGEPORTS" within the reach of ALL shops, large and small.

... BRIDGEPORT and BRIDGEPORT ONLY provides this exclusive feature: a means of milling, drilling, boring and shaping combined with ability to position the milling head at all angles over a wide area . . . WITHOUT CHANGING SET UP.

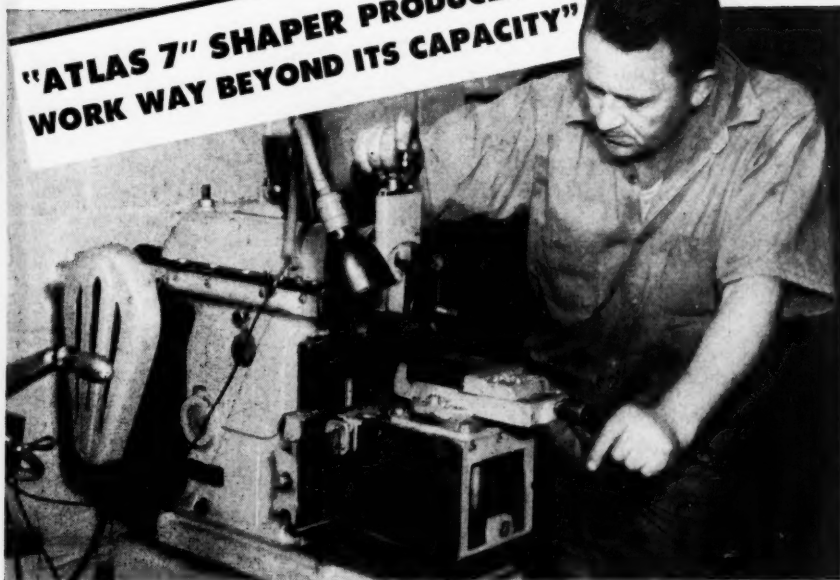
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***Bridgeport* MACHINES, INC.**

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

**"ATLAS 7" SHAPER PRODUCES
WORK WAY BEYOND ITS CAPACITY"**



Tool and die shop makes 6' x 10" blanking, forming, punching die on Atlas 7" Shaper

Practical imagination is often the only limit to good use of the precision and power of the Atlas 7" shaper. You can't make a 6' x 10" die with a 7" stroke tool—unless you do it in sections, as did Albert Christoffersen.

How often in your shop does a small shaping operation tie up a big shaper—with all its extra set-up, operating, and overhead costs? An Atlas 7" shaper—for only \$410.00 F.O.B. factory—quickly pays for it-

self in most shops. The work it can do plus the time it saves are usually amazing to most machinists.

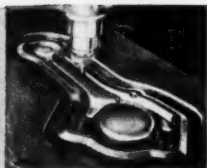
The Atlas 7" shaper is ruggedly built with powerful cast iron bull gear with 1" face, wide speed and feed range, OUTSIDE stroke adjustment, 15% more ram bearing surface. It is the only 7" shaper with Timken tapered roller bearings. See all its features at your Atlas dealer's, or send for latest catalog.

ATLAS PRESS COMPANY

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Atlas

DEPENDABLE QUALITY TOOLS SINCE 1911



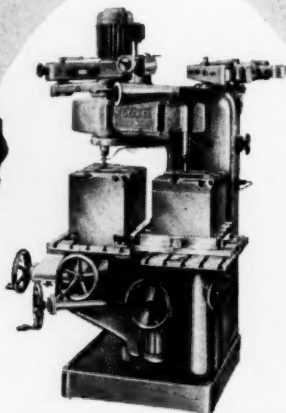
ECONOMICAL, ACCURATE PRODUCTION

OF DIES AND MOLDS
WITH THE LATEST

DECKEL

universal pantograph DIE SINKING MACHINE model KF12

Deckel die sinking machines are justly famous for their accuracy, production rate, and ease of operation. The KF12, latest and largest Deckel model, does heavy die-sinking jobs which formerly required much greater investment in equipment. Spindle speeds from 60 to 10,000 r.p.m. enable you to do rough and finish milling, as well as light engraving, on the same machine. The newly developed, "mirror image" milling attachment produces right and left hand dies and molds from the same pattern. Other important features are illustrated below.

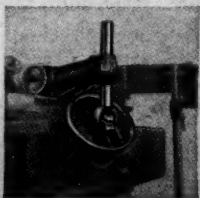


Deckel KF12 makes rapid, accurate enlargements or reductions from 1:1.5 to 1:4 as well as 1:1 duplication. The cutting tool covers an area up to 15 3/4" x 15 3/4" or up to 10" x 19 3/4".



Saddle elevating motor rapidly raises or lowers master and work-piece at the same time.

Circular forming attachment permits generating spherical shapes.



Optical contacting device makes rough milling faster, more accurate. And, accurate rough milling reduces time for finishing.

Get in touch with us soon for information on this or other Deckel machines:

2-DIMENSIONAL ENGRAVERS • 3-DIMENSIONAL ENGRAVERS
UNIVERSAL MILLERS • UNIVERSAL TOOL & CUTTER GRINDERS

COSA CORPORATION

405 Lexington Ave., New York 17

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.



Cylinder gears—ground on a Reishauer ZA.

PRECISION GEARS...

the heart of fine printing presses...

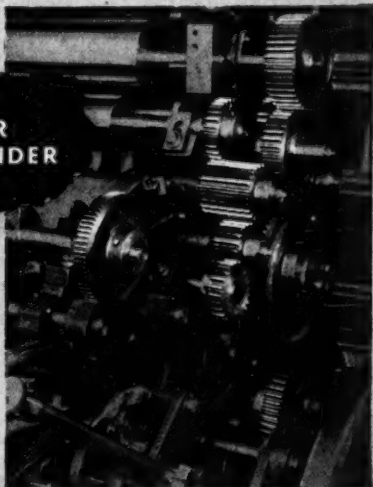
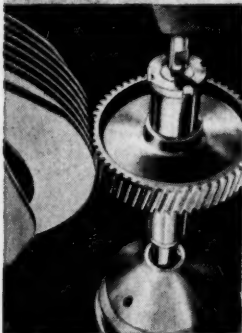
are ground by **AMERICAN TYPE FOUNDERS**

on a

REISHAUER ZA GEAR GRINDER

Precision gears in a printing press are important, but cylinder gears on the ATF Chief are vital—they, in particular, must be accurately ground to prevent gear streaks on printed material, and they must be durable, to provide long-term accuracy. Therefore, ATF makes these gears from hardened alloy steel and precision-grinds them on the Reishauer ZA.

Heart of the Reishauer ZA—grinding wheel and spindle.



Gear train on an ATF Press—ground on a Reishauer ZA.

ATF is not alone in its respect for Reishauer's speed and accuracy—this machine is widely used to grind spur and helical gears in the automotive, aircraft, machine tool, gear-jobbing, and instrument industries.

Why is the Reishauer ZA so widely used? For one thing, it combines accurate grinding with production speed. For instance, floor-to-floor grinding time, on pre-hobbed gears, is about 8 to 13 seconds per inch-tooth.

There are many other reasons why the Reishauer ZA is the best production gear grinding machine you can get. If you want proof, we'll be happy to supply it. Get in touch with us soon, won't you?

COSA CORPORATION

405 Lexington Ave., New York 17

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 33, Mich.

Your source for all Precision Machine Tools—
from Small Bench Lathes to Large Boring Mills

HOLDING POWER

Plus!



Magna-Lock CHUCKS



Get Bulletin
050...WRITE
DEPT. MM-63

22% MORE MAGNETIC AREA...
WORK-PIECES HELD TO EXTREME
EDGES OF CHUCK... 3 TYPES
... WIDE SIZE RANGE.

Magna-Lock

Hanchett **MAGNA-LOCK CORPORATION**
Magnetic Chucks and Devices
BIG RAPIDS MICHIGAN, U. S. A.

**SIX SPINDLE
PRE-SELECTIVE SPINDLE SPEEDS
TURRET TYPE AUTOMATIC INDEXING
DRILLING AND TAPPING MACHINE**

... gives you **6** **MACHINES**
IN ONE

THE NEW No. 2 MODEL A

Burgmaster

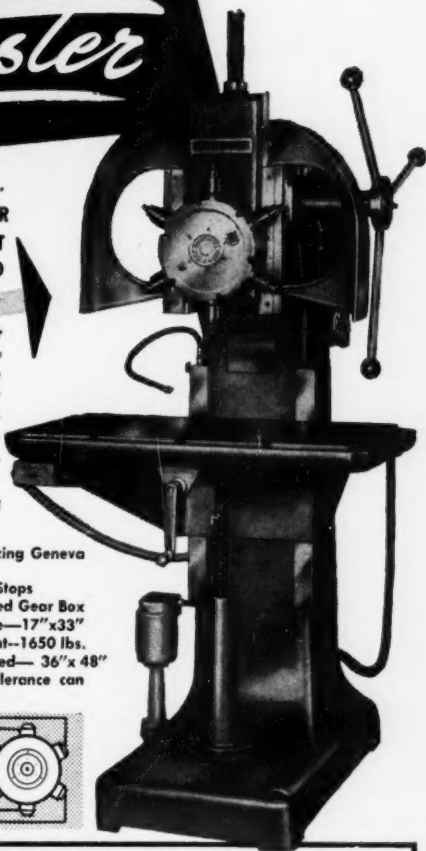
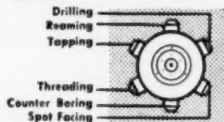
Designed for...
**HIGHER PRODUCTION WITH GREATER
ACCURACY AT LOWER COST
PER PIECE MACHINED**

The No. 2 Model A BURGMASTER will definitely cut your second operation costs because: Loss of time due to movements of parts from one spindle to another are eliminated; Close tolerances on size and concentricity are easily maintained; Set-up is simple and fast — unskilled operators can run the machine; Less floor space and power required; Rigidity, power and spindle speeds permit the use of high cutting speeds.

Now equipped with Warner electric clutch units in speed change mechanism.

- ★ $\frac{3}{4}$ " Drill Capacity
- ★ $\frac{1}{4}$ " Tap Capacity
- ★ 1 to 2 H.P., 2 speed, 3 phase, 60 cycle Motor
- ★ 12 Spindle Speeds, ranging from 225-3000 R.P.M.
- ★ 4 Speeds, pre-selective per spindle, at any one setting
- ★ 8" Ram Feed
- ★ 19" Table Travel
- ★ Throat Depth—11-5/16"
- ★ Spindles Mounted on Class "O" Timken Bearings

- ★ Power Index, utilizing Geneva Mechanism
- ★ Individual Depth Stops
- ★ Completely Enclosed Gear Box
- ★ Table work surface—17"x33"
- ★ Approximate weight—1650 lbs.
- ★ Floor space required—36"x48"
- ★ Extremely close tolerance can be held



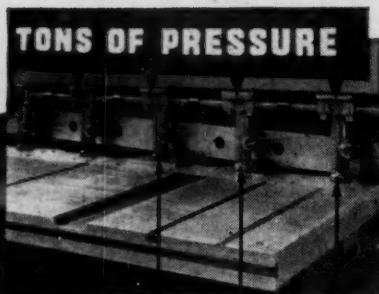
Write today for detailed information.

BURG TOOL MANUFACTURING CO. DEPT. MM-12

3743 DURANGO AVENUE • LOS ANGELES 34, CALIFORNIA

ACCURACY is

TONS OF PRESSURE



$\frac{3}{8}$ " 10 Gauge Zero

Micrometer accuracy starts with Cincinnati Hydraulic Holddowns. They exert tons of pressure and automatically hold all thicknesses of work securely.



necessary

...AND THE SPEED

AND VERSATILITY OF

CINCINNATI SHEARS

IS NEEDED, TOO...

Here at The W. J. Holliday Company, Inc., The Department Store of Steel—these busy Cincinnati Shears operating continuously, shear accurate blanks to customer size.

They handle cold finished, or pickled and oiled sheets up to 10 gauge and hot rolled sheets up to 1/4". Both management and operators are enthusiastic about their Cincinnati Shears.

Write for Shear Catalog S-6.

Photos courtesy The W. J. Holliday Company, Inc.,
Indianapolis, Indiana

THE CINCINNATI SHAPER CO.

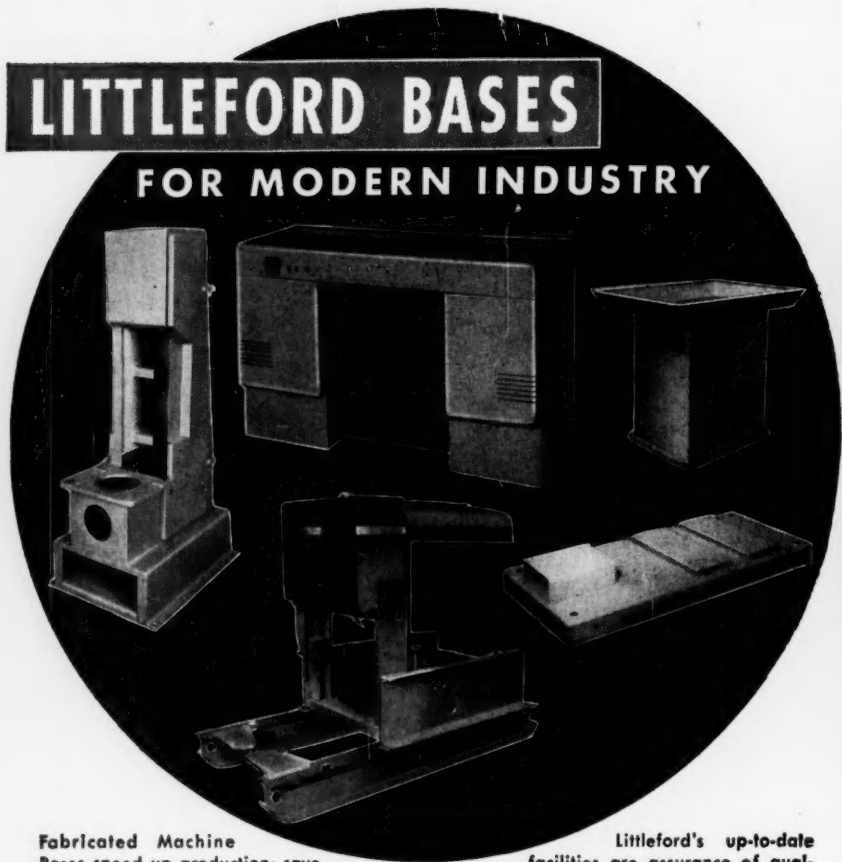
CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES



LITTLEFORD BASES

FOR MODERN INDUSTRY



Fabricated Machine

Bases speed up production; save valuable man hours. Fabricated Bases eliminate machining operations, make alterations easy without expensive pattern changes. Welded Bases are stronger and lend themselves to modern design.

Whether you need one or hundreds of Fabricated Bases, and regardless of shape,

Littleford's up-to-date facilities are assurance of quality workmanship. In addition to Bases Littleford can fabricate Pans, Guards, Special Metal Parts, and Sub-assemblies to facilitate fast and accurate production. Remember there's no substitute for experience. Send blueprints today for an estimate of cost.

FABRICATORS
OF
PLATE AND
SHEET METAL
PRODUCTS
FOR INDUSTRY
SINCE 1882



LITTLEFORD

LITTLEFORD BROS., INC.
433 EAST PEARL STREET
CINCINNATI 2, OHIO

NOW AVAILABLE...
with EXTRA FEATURES at
no EXTRA COST!

... this new

STERLING

MODEL "G"

UNIVERSAL TOOL AND CUTTER GRINDER



Completely NEW from base to wheel head. Designed with these extra features to give you FASTER grinding performance.

- Direct drive Excella Spindles
- 360° wheel head rotation
- 10 3/4" swing over table
- Convenient controls for operating from any position.
- 27" between centers
- 180° table rotation
- 2 speed manual table traverse
- Micrometer taper adjustment
- Sensitive and accurate
- Case Base dampens vibration

The new Sterling Model "G" can easily handle all the tool and cutter grinding in the average shop. Available in either the Universal or Plain grinder.

SAVE TIME and do those EXTRA jobs
with a Model "G" Sterling grinder

MCDONOUGH MFG. CO.

1521 Galloway • Eau Claire, Wisc.

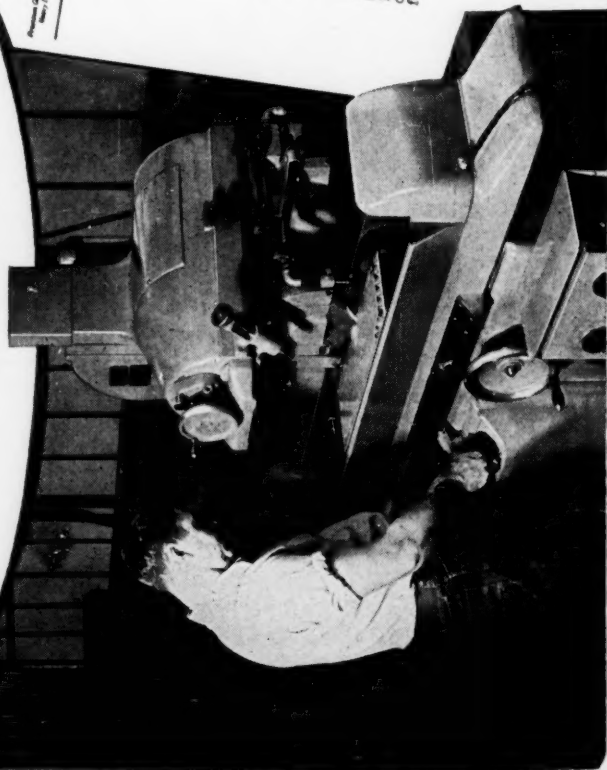
**THIS
NEW
CATALOG...**



gives you complete information and specifications on the STERLING Model "G" grinder. Just drop us a post card for your free copy.

Here's Proof
The New Thompson Type 2F is a
SUPER PRECISION
Tool Room Grinder

**The New Thompson Type 2F is a
SUPER PRECISION
Tool Room Grinder**



*Phonogram Cops Records - Single Cops Records
Heavy Duty Cops Records - Cops Records*



WEBBER GAGE COMPANY
12900 TRISKETT ROAD - CLEVELAND, OHIO

**Mr. Wilson, Vice President
Thompson Grinder Company
Springfield, Ohio**

Dear Mr. Wilson:

We recently installed a new THOMPSON Tool Room Grinder to grind Gage Blocks to our specifications and tolerances. The results have been very satisfactory, in spite of the close limits to which the work has to be done. We thought you would be interested in the performance of this machine.

Very truly yours,

WETTER GAGE COMPANY

George D. Webber
George D. Webber

Thompson 2F Grinder Photo-
graphed in the Webber Gage Co.,
Cleveland Plant

COMPARE THIS NEW 8 x 10 x 24 TOOL ROOM GRINDER

Compare These Features:

- HARDENED AND GROUND cross slide ways completely sealed.
- One shot lubrication to cross slide ways and internal saddle bearings.
- HARDENED AND GROUND sealed anti-friction vertical slide.
- HARDENED AND GROUND BED WAYS with automatic lubrication.
- 3600/1800 R.P.M. 2 speed wheel head. Heavy alloy steel spindle heat treated, runs in super precision ball bearings accurately preloaded, lifetime lubricated.

When working to a tolerance of four millionths of an inch such as is observed when making Webber Gage Blocks, the rough or preliminary grinding plays an important role in keeping cost of the final finishing within reasonable limits.

Handy control panel.

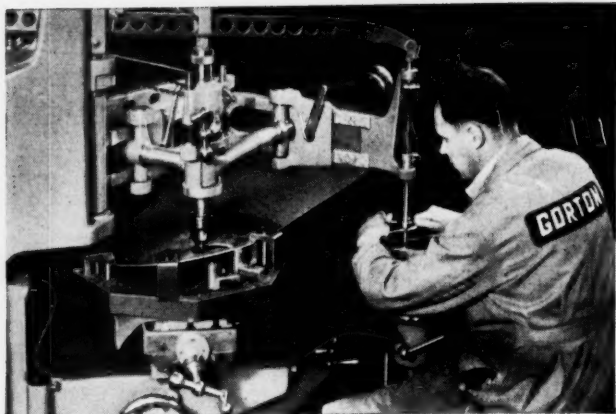
- Elevation micrometer stop graduated in .0001".
- GROUND THREAD FEED SCREW.
- Automatic wheel TRUING device.
- Longitudinal hand wheel with automatic engagement.
- Hydraulic head movement throttle with rapid traverse.
- Hydraulic table movement throttle.
- Elevating hand wheel graduated in .0005".
- GROUND THREAD FEED SCREW.

WRITE TODAY for complete specifications and performance data. Address Dept. 14 Thompson Grinder Co., Springfield, Ohio.

▶ The only manufacturer of a complete range of heavy duty and light duty surface and contour grinders for industry.

Thompson SURFACE Grinders

The Thompson Grinder Company, Springfield, Ohio



Tracer-Controlled Pantograph cuts and rounds thermal slot in 8-foot steel propeller blade in 40 minutes; previous time was 5 hours. 10 minutes — just one of hundreds of examples of time and cost saving with tracer-controlled Pantograph machines.

Pantography IS NEW —

By George Gorton III
Executive Vice President
George Gorton Machine Co

INDUSTRY'S foremost responsibility right now is to produce faster, to highest quality standards and at lower cost — whether on defense contracts or for our civilian needs.

Today, there are literally thousands of operations being performed throughout industry which can be speeded up, improved in quality and lowered in cost by the use of available models of special machine tools. The modern tracer-controlled Pantograph machine is such a tool. It is both a special purpose machine, ideal for short runs, and it is an accurate single purpose machine which turns out identical parts or pieces to meet tight production schedules.

The tracer-controlled Pantograph machine is used for inside and outside profiling, routing, die sinking, mold cutting, counterboring, contour milling, chamfering, grooving, graduating and engraving in ferrous and non-ferrous metals, as well as in plastics.

This machine performs on flat, uniformly curved, cylindrical, spherical or

— in the sense that industry at large and Metal Working people in particular are just beginning to appreciate the many advantages Pantography offers to those faced with the Design-Production problems of today and tomorrow.

irregular shapes — it works in either 2 or 3 dimensions, in all directions on a horizontal plane, and vertically. It employs enlarged masters, templates or patterns which are quickly and easily made and operates normally at a reduction ratio thereby increasing accuracy — exclusively characteristic of the pantograph.

Single or repetitive accuracy — from one piece to thousands — manual or full automatic operation depending upon quantities — work sizes from the size of a dime to as large as 10 feet.

A new booklet, "Pantography," explains the process and shows what this type of machine can do for you. It is yours without obligation. Write for it today. If interested, also ask for our latest General Catalog 1655. Address the George Gorton Machine Co., 1706 Racine St., Racine, Wisconsin, U. S. A.



THIS YOU SHOULD KNOW FOR YOUR PROFIT

BECAUSE of rugged construction and engineering to handle greater loads than can be imposed upon them, FULMER HONING MACHINES assure LOW UPKEEP under the most exacting operating conditions.

All machines have a wide range of spindle and reciprocation rate. Practically all models are based on 3 steel columns to take the high torque necessary for heavy stock removal.

Speed cutting and finishing and insure tolerance as close as .0001 (\pm).

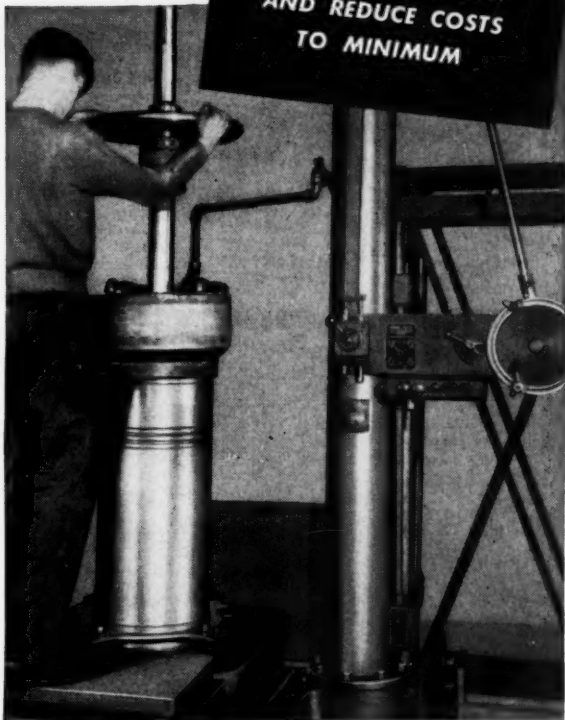


Photo taken in plant of THE HUNT-SPILLER MFG. CORP., BOSTON, MASS.

C. ALLEN FULMER CO.

Write for
your copy
of our
bulletin on
honin^g.

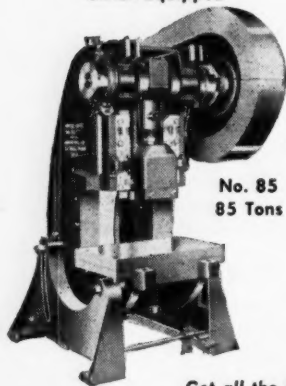
1233 First National Bank Bldg.

Cincinnati 2, Ohio

How does YOUR PRESS check out?



No. 60
60 Tons—Air
Clutch Equipped



No. 85
85 Tons

STANDARD PRESS FEATURES <small>(at no extra cost)</small>	PRESS- RITE	YOUR PRESS
Uni-Cast Frame	✓	
Anti-Friction Roller Bearings in Flywheel	✓	
Four Point Engagement Sliding Clutch Key	✓	
Automatic Cam Operated Brake	✓	
Cam Operated Single Stroke Safety Mechanism	✓	
Built-In Tie Rods	✓	
Triple Ramway Lubrication	✓	
Bronze Bushed Main Bearings	✓	
Replaceable Die Shank Bushing	✓	
Airflex Friction Clutch (optional at extra cost)	✓	

PRESS-RITE POWER PRESSES

Now You Get All These Features in **One** Press . . . the Press-Rite Press. Buy Press-Rite Presses today and get increased production . . . longer die life . . . greater operator confidence . . . longer press life . . . and scores of other benefits. Press-Rite Presses help to cut your operating expenses and eliminate costly down time. Find out more about Press-Rite Presses today.



Get all the Facts. Send for Bulletin P552.

Sales Service Machine Tool Co.

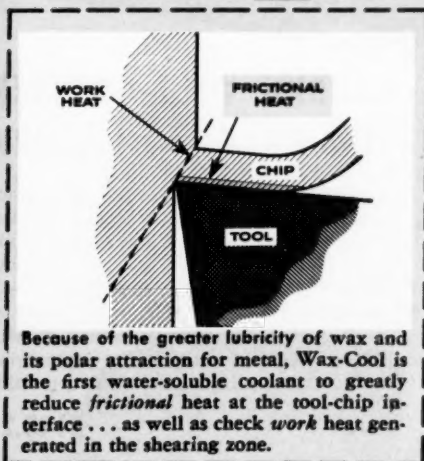
PRESS RITE PRESSES • SHAPE RITE SHAPERS • KELLER POWER HACK SAWS

2355 UNIVERSITY AVENUE • ST. PAUL 4, MINNESOTA



JOHNSON'S WAX-COOL CUTS 2 KINDS OF HEAT!

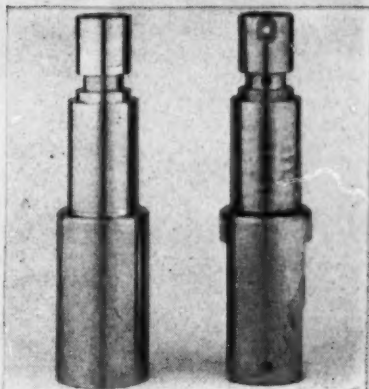
The only coolant that effectively attacks frictional heat as well as work heat



Wax-Cool has these advantages:

1. **WAX-COOL** stays with tools and material even under high heat and pressure.
2. **WAX-COOL** prevents chip weld because work runs cooler.
3. **WAX-COOL** effectively minimizes frictional heat, which is by far the principal source of heat.

Here is proof!



Parts of a stud driving gun (#4140 annealed alloy steel). Smooth finish at left resulted from Wax-Cool's greater lubricity. Poorly finished part shows results obtained from ordinary coolant.

Here are Wax-Cool's other benefits:

- Tool life almost doubled.
- Finish feed stepped up from .004 per rev. to .007 per rev.
- Speed increased from 300 R.P.M. to 680 R.P.M.
- Eliminated problem of handling hot chips.

A test is your best proof

In your own shop, Johnson's Wax-Cool can show you savings in tools and time plus performance standards you never believed possible. Call your local Johnson industrial distributor, or write to:

Ask about Wax-Cut—wax-type cutting oil for automatic screw machines, gear cutting machines, etc.

Ask about Wax-Draw—wax lubricant for drawing and forming all types of metals.

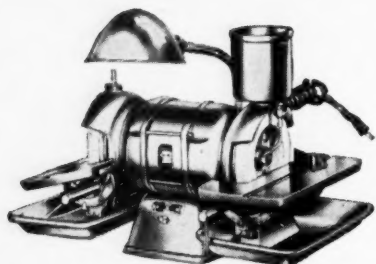
Industrial Products Department MMS- 6
S. C. Johnson & Son, Inc., Racine, Wisconsin



A product of Johnson's Wax Research

Baldor

BALL-BEARING GRINDERS



Clip this ad and mail for bulletins on
Carbide Tool Grinder.

NEW BALDOR W-I-D-E CLEARANCE GRINDER

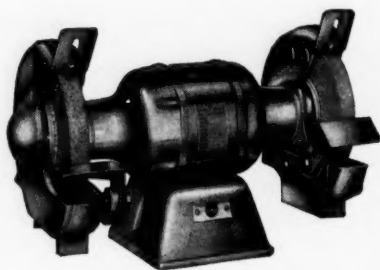
Baldor is a basic manufacturer of Grinders—even the motors are built by Baldor. The new streamlined grinder, 8200 series, is excellent for grinding long and odd-shaped pieces as there's plenty of clearance between the wheels and the motor frame. ½ hp, 3450 RPM, capacitor-start, capacitor-run motor GUARANTEED 2 years against burnout. Baldor makes a complete line of 6"-12" general purpose bench and pedestal grinders. Complete price as shown.

\$86.00

CARBIDE TOOL GRINDER FOR PRECISION WORK

The ½ hp motor that powers this Baldor Carbide Tool Grinder has no commutator, no centrifugal switch, no brushes—a really trouble-free motor that will not burn out even when overloaded repeatedly. Electronically balanced within 1/50 ounce of perfection, the armature rotates at 3400 RPM without vibration—an engineering achievement that makes true precision work possible. Complete price,

\$143.20



Note exhaust type guards.
Ask for Bulletin 353.

BALDOR ELECTRIC COMPANY

5353 Duncan Avenue

• St. Louis 10, Missouri

a
time tested
line of
machine tools

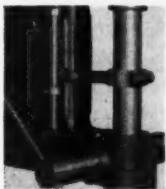
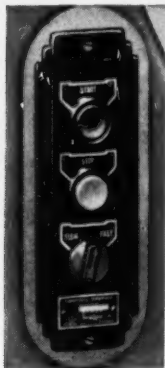


● Here is a machine designed to perform light drilling and tapping operations at high speed with a minimum of effort. Any one of six spindle speeds may be quickly selected and tapping is always instantly available without any adjustments to the machine. It makes an excellent choice for miscellaneous work on a large layout of varying size holes.

THE FOOTE-BURT CO., Cleveland 8, Ohio
Detroit Office: General Motors Building



● A Unique Radial Drilling Machine with Hinged Bracket that makes it possible to swing quickly from hole to hole over a wide area. A very convenient tapping arrangement is incorporated in this machine.



engineered
for
production

FOOTBURT
M A C H I N E T O O L S



Check hole sizes and locations, find centers,



and dozens of other uses with

HORBERG



gage slots, precision taper Pin Gages

Diagram of a pin gage showing: HALF TAPERED, + 0.0001, - 0.0000

SAVE TIME AND MATERIALS

Oil-hardened tool steel tapered pin gages accurate to $+0.0001'' - 0.0000''$ insure dependable sizing and location of holes and slots for machinists, set-up men, tool and die men, inspectors, all who need precise hole measurement.

CONCENTRIC TAPER on lower half of each gage fits holes $0.0012''$ smaller

than standard letter, fraction, and number size drill holes. Makes insertion easier. Permits gaging of odd-size holes and slots.

ALL GAGES are $1\frac{1}{2}$ inches long. Sets contain a pair of each size in a plastic case with 4-place decimal equivalents of each size plainly marked.

ALL ITEMS STOCKED FOR IMMEDIATE DELIVERY

THE *Horberg* GAGE COMPANY

Quantity **23 STAPLES ST., BRIDGEPORT, CONN.**

..... Letter sets @ \$45.
52 gages (A-Z)

..... Fraction Sets @ \$50.
60 gages ($\frac{1}{16}''$ to $\frac{1}{2}''$
in $\frac{1}{32}''$ steps)

..... Number Sets @ \$90.
120 gages (1 to 60)

..... Single gages @ \$ 1.

..... Stand alone @ \$10.

Please Rush checked items and literature to

company.....

address.....

name.....

title.....

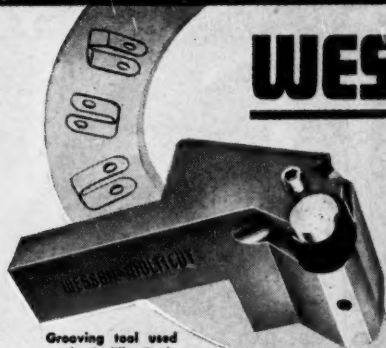
Specialists in Designing and Producing Carbide Cutting Tools

WESSON BAND
TYPE

TOOL HOLDERS

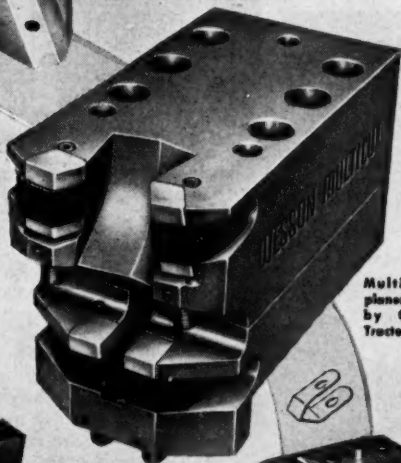
Special and Standard

with replaceable bands
at low cost.

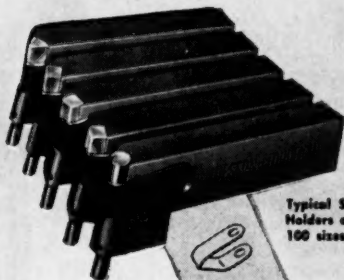


Grooving tool used
on the Cadillac Tank.

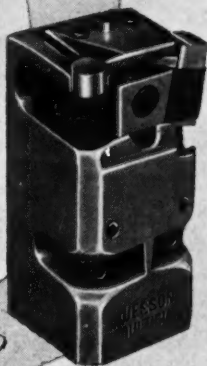
**ALL THE WEAR ON
THE BAND MEANS
EXTRA ECONOMY, EXTRA
EFFICIENCY, HOWEVER
SIMPLE OR COMPLICATED
YOUR TOOL HOLDER
PROBLEM!**



Multiple insert
planer tool used
by Caterpillar
Tractor.



Typical Standard Wesson Tool
Holders available in 10 styles,
100 sizes.



2 insert tool for turn-
ing Ford-Lincoln rear
axle shaft on a Bul-
ford Man-a-trol.

WESSON
Carbide Cutting Tools

First choice when tough metals are to be cut—
for special or standard purposes—
for single or multiple inserts.

WESSON COMPANY 1220 Woodward Heights Boulevard
FERNDALE (DETROIT 20) MICHIGAN
Affiliated with WESSON METAL CORPORATION, Lexington 34, Kentucky

AMES



... the preferred Dial Indicators

One of America's largest and most famous mass-producers recently chose Ames as preferred source of supply for indicator gauges. They did because the four sizes of Ames "Hundred Series" indicators fit every measuring requirement; they are *accurate, sensitive, low in friction, yet are rugged and tough* — give *more on-the-job time*. All Ames products embody latest design and highest-quality materials; they are manufactured by methods and machines that are *exclusive* with B. C. Ames Co.



Ames
Dial Depth Gauge
No. 11C

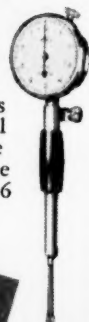
Ames
Dial
Micrometer
No. 517



Ames
Amplifying
Dial Comparator
No. 26



Ames
Small
Hole
Gauge
No. 36



Send today for your free copy
of Catalog No. 58

Representatives in
principal cities

B. C. AMES CO. 29 Ames Street
Waltham 54, Mass.

Mfr. of Micrometer Dial Gauges • Micrometer Dial Indicators



Are You Overlooking A WAY TO CUT YOUR TAP COSTS UP TO 75%?

You May Be ... If You Haven't Investigated the



Leading metalworking concerns now using the B.P.S.* System have reduced their tap cost by 50 to 75%. These B.P.S.* benefits can be *yours!*

WHAT IS THE B.P.S.* SYSTEM?

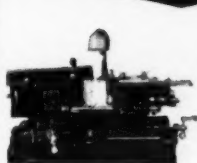
It consists of two basic ideas: (1) Sharpening the flutes and chamfers of taps to an exceptionally high degree of accuracy (possible only on Blake grinders) and (2) Sharpening your taps at *regular, planned intervals.*

HOW DOES THE B.P.S.* SYSTEM REDUCE COSTS?

By using the Blake Chamfer Grinder and Blake Flute Grinder, your operator can sharpen each tap precisely—to *exactly* match a previously determined index and rake angle. This enables each tap to cut much more accurately with less strain, thereby greatly increasing tap life. This superior sharpening method makes taps last many times longer!

*Blake Precision Sharpening

HERE'S WHAT THE B.P.S.* SYSTEM CAN DO FOR YOU!



BLAKE CHAMFER
GRINDER



BLAKE FLUTE
GRINDER

- Gives much more production per tap!
- Greatly reduces tap costs!
- Provides greater tap accuracy and uniformity!
- Greatly reduces tap breakage and spoiled or unacceptable work!

INVESTIGATE THE B.P.S.* SYSTEM NOW!

Write us for reprints of *American Machinist* and *Machinery* articles on this subject. Descriptive folders on both Blake grinders also available.



EDWARD BLAKE COMPANY

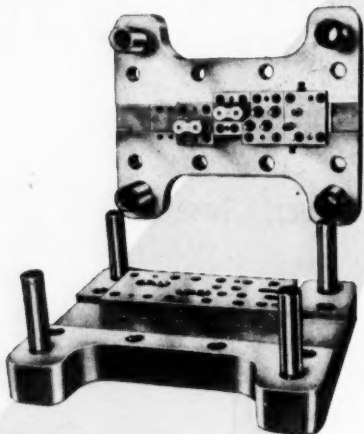


438 CHERRY STREET • WEST NEWTON 65, MASS.

Black Diamond Precision Drill Grinders • Waltham Cutter Sharpeners • Surface Finish Standards

WHITNEY CHAIN

links up with... **PRODUCTO** DIE SETS



MATERIAL

$\frac{1}{4}$ " SAE 3140 hot rolled steel in coiled stock.

OPERATIONS

Station No. 1 — Whitney Chain markings clearly embossed on each link.

Station No. 2 — Four holes, two to a link, rough pierced.

Station No. 3 — Two chain links blanked out on each press stroke.

TOLERANCES

Hole diameter + .0005" — .0005"

Hole centers + .001" — .001"

Link Contour + .005" — .010"

Die Set face parallel to feed slot + .002" — .002"

PRODUCTION RATE

153,000 links blanked per 40 hour week.
Between grinds, 75,000 pieces.

NEED PROMPT SERVICE?
CALL YOUR NEAREST
PRODUCTO ASSEMBLY BRANCH

Tough, $\frac{1}{4}$ inch-thick hot rolled steel chain links are not an easy stamping job... especially when heavy production must be matched with close tolerances and excellent finish.

Here are the figures as this job rolls along at Whitney Chain on Niagara presses equipped with PRODUCTO 4-pin progressive die sets. It's typical of the way Producto Service teams up to set production records.

THE PRODUCTO MACHINE COMPANY
910 Heustontic Ave., Bridgeport 1, Connecticut

For Precision Die Sets Fast Call...



ALSO MAKERS OF TOOL AND DIEMAKERS ACCESSORIES, VISES, MACHINERY

3P088



Smoother operating!...

because they have the lowest coefficient of friction of any cylinder

For efficient performance at low pressure, the O-M Cylinder really stands out! Smoothness of bore (4 to 7 micro-inches), and self-adjusting packing reduce friction . . . floating-cushion noses eliminate binding, dragging, jerking. This assures a smoother stroke at low or high speeds.

Every O-M Cylinder is All Cylinder! Interlocking mechanism does away with projecting tie rods and end caps, saving up to 1/3 installation space, and permitting the use of a more powerful cylinder for the job. Easier to install and repack. End plugs tapped for universal mounting. All machined steel, with bearing bronze (no castings)—easily turned down to fit in deep recesses of machines or bases.

14-DAY DELIVERY ON MOST SIZES

Available in a full range of sizes (1 1/2" to 8" bores) with standard, 2 to 1 or oversize rods. Completely interchangeable parts.

O-M

air • hydraulic
CYLINDERS



Write today for FREE catalog and complete set of 1/2 and 1/4 scale templates showing all cylinders and mounting brackets.



interchangeable bore for bore

ORTMAN-MILLER MACHINE CO.

1203 150th Street, Hammond, Indiana

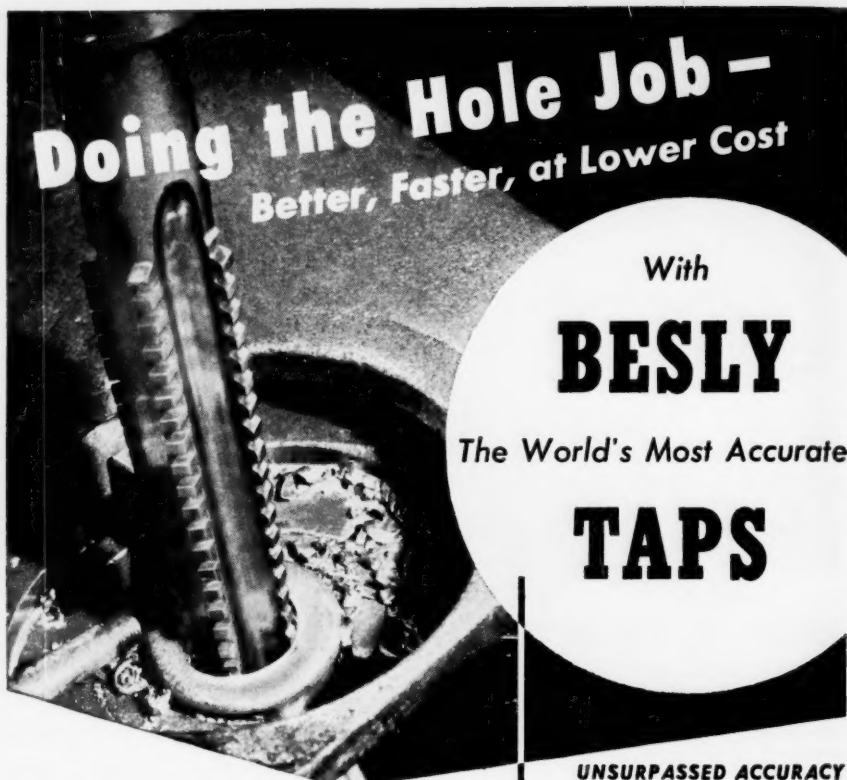
- ☐ Please send latest O-M Catalog
☐ Please send Complete Set of Templates

Name _____ Position _____

Company _____

Address _____

City _____ Zone _____ State _____



Doing the Hole Job —
Better, Faster, at Lower Cost

With

BESLY

The World's Most Accurate

TAPS

• LET US PROVE that Besly can help you get better threaded parts, longer tap life and lower tapping costs.

Ask your authorized Besly Distributor for a TRIAL RUN on your toughest jobs . . . PLUS details on Besly's Super-Service on "Specials".



**BESLY-WELLES
CORPORATION**

Established as Charles H. Besly & Co. in 1875
108 Dearborn Ave. • Beloit, Wisconsin

**BESLY Drills, Reamers and End Mills—High-Speed
Cutting Tools in a complete range of types and sizes.**

**UNSURPASSED ACCURACY
AT ALL VITAL POINTS**



Microcentric CHAMFER



**Accurate
RAKE ANGLE**



Solid-Ground THREAD FORM



**Mirror-finish
FLUTES**



Tru-Square DRIVER

TAP TIPS

The handy "Handbook for Tap Users" is full of information on tapping methods and tap selection. Write for your Free Copy.



SOUTH BEND 900 TURRET LATHE

Keeps Production UP and Costs DOWN on Precision Parts

Here's a precision turret lathe that will help you turn out a heavy volume of small precision parts. High output comes easy on the 900 Turret Lathe. It's fast and easy to operate. A wide range of speeds and power feeds permit efficient machining. Close tolerances can be held without sacrificing speed. Tool changes are quick and easy to make. These advantages

also make the 900 Turret Lathe ideal for second operations. If you are producing small precision parts it will pay you to find out more. *Send coupon today for information.*

SPECIFICATIONS

Collet Capacity— $\frac{1}{2}$ "

Spindle Bore— $\frac{3}{4}$ "

Swing— $9\frac{1}{4}$ " over bed,
3- $9\frac{1}{16}$ " over double tool
cross slide, $5\frac{1}{2}$ " over
compound cross slide.

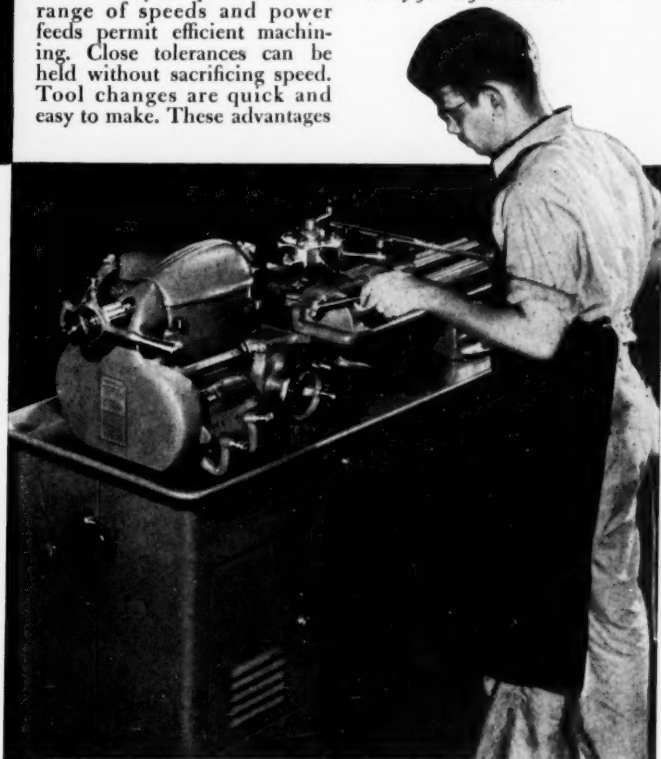
Turret to Spindle Dis-
tance— $20\frac{3}{8}$ "

Spindle Speeds—12; 41
to 1270 r.p.m.

Power Longitudinal
Feeds—48

Power Cross-feeds—48

Thread Cutting—48
pitches R.H. or L.H. 4 to
224 per inch



PLEASE SEND
INFORMATION
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☐

☐ TOOLS & ATTACHMENTS



☐ 9" and 10"
BENCH LATHES



☐ 10" to 16-34"
FLOOR LATHES



☐ DRILL
PRESSES



☐ TOOL
GRINDERS



☐ $\frac{1}{2}$ " & 1" Collet
TURRET LATHES



☐ 7"
BENCH SHAPERS

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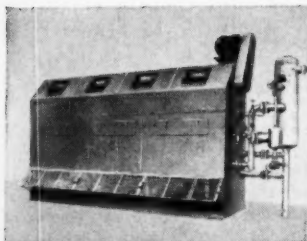
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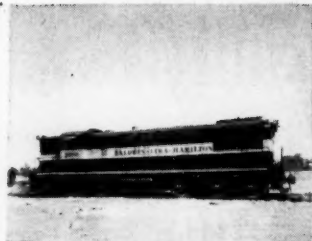
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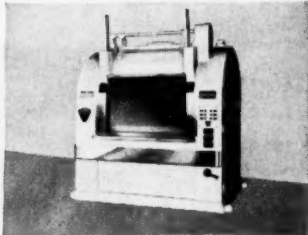
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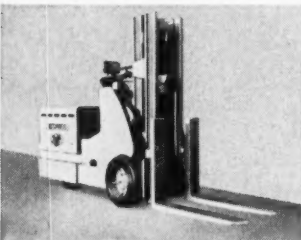
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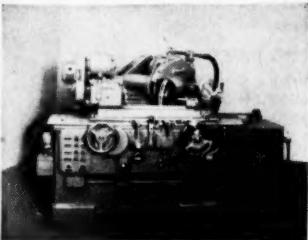
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can
eliminate
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set-up
and reduce
handling time
with a

**WIEDEMANN
TURRET
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These are just a few who do!

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WIEDEMANN MACHINE COMPANY

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**180 or 360 CYCLE
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Thor—and only Thor—specializes exclusively in the manufacture of portable power tools . . . of ALL types.

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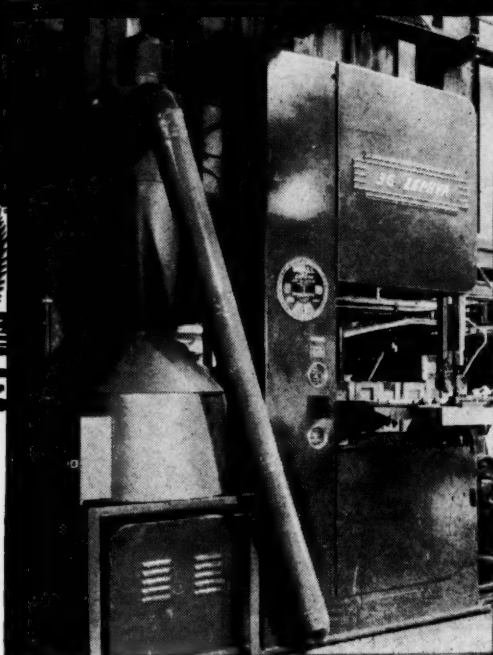
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TORIT DUST COLLECTORS



**WORK WELL IN
CLOSE QUARTERS**



Torit Dust Collectors are available in both cabinet and cyclone types, in sizes ranging up to 5 h. p.

Note how compactly this Torit 19 FB Dust Separator fits into unused space at the back of a Do-All band saw. It is completely out of the way yet so close to the work that piping, and attendant loss, is minimized. The operator reports a dust collecting efficiency of 99%, with plastic and hard rubber as well as metals.

Torit Dust Collectors are compactly designed, self-contained units. There are models for every standard task and special adaptations can be quickly created. They can fit into your present production lines without a ripple and will make smooth sailing of your dust problems. Write for details.

see our catalog in

**MACHINE
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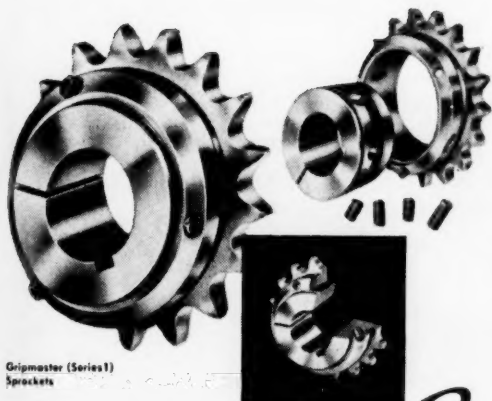
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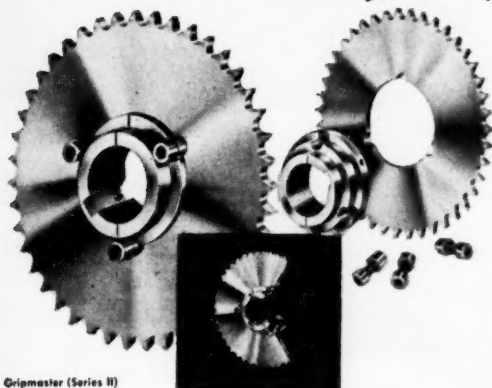


Gripmaster (Series I)
Sprockets

IT'S NEW IT'S DIFFERENT!

A revolutionary, all steel sprocket system that is rugged, light and compact. Featuring interchangeability, maintenance ease and simplicity, the Cullman Gripmaster sprocket system embodies fundamental design principles which are uniquely adapted to achieve a perfect gripping action throughout a complete sprocket range.

CULLMAN *Gripmaster* S P R O C K E T S



Gripmaster (Series II)
Sprockets

Check these advantages!

- ▶ "Off-the-shelf" service
- ▶ Reduced inventory requirements
- ▶ Alterations eliminated
- ▶ Positive shaft fits
- ▶ Simplified speed changes
- ▶ Minimum service requirements

Contact your local distributor
for further information.
Meanwhile, send the coupon
for your copy of the
Cullman Gripmaster Catalog.



CULLMAN WHEEL COMPANY
1352V Altgeld Street, Chicago 14, Illinois

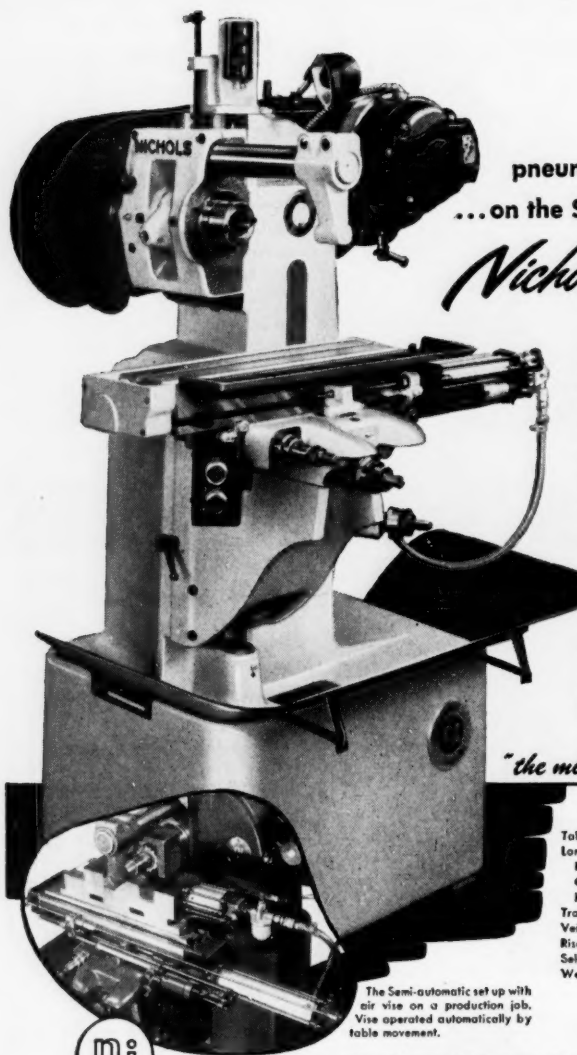
Please send me your new illustrated Grip-Master catalog
giving tables of specifications and prices.

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pneumatic feed — for speed
... on the SEMI-AUTOMATIC

Nichols Miller

In selecting the Nichols Miller with pneumatic table feed, you obtain precision and a high-production semi-automatic machine. The push-button controlled power feed is entirely automatic — leaves the operator free to merely load and unload the work. Often he may run two or three millers with ease. The air cylinder works against the cutter and the hydraulic cylinder — completely eliminating chatter and table jump. The unit provides rapid advance from loading position to the cutter, infinitely variable cutting feed, and rapid return to loading position. Also available with power vertical feed to spindle head. If you want high production to "tenths", investigate the Nichols Semi-automatic!

"the miller that uses its head!"

CONDENSED SPECIFICATIONS

Table Working Surface	6 1/4" x 21"
Longitudinal Travel	
Pneumatic	9"
Cutting Stroke	5 1/4"
Hand Screw (Optional)	10"
Transverse Travel	7"
Vertical Travel — Knee	13 1/4"
Rise and Fall of Spindle	4 1/4"
Selective Speed Ranges up to 5000 R.P.M.	
Weight	1250 lbs.

The Semi-automatic set up with air vise on a production job. Vise operated automatically by table movement.




Write today for the Nichols general catalog, which describes the six models of Nichols Millers. A sound, color movie, "The Miller that Uses its Head" is available for free showing. May we reserve it for you?



MANUFACTURED BY W. H. NICHOLS COMPANY WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

76-H MAMARONECK AVE.
WHITE PLAINS, N. Y.



John Coulter says, "This Model 142 SKIL Grinder with its easy handling makes grinding of these castings a lot easier. It's well balanced for either right or left hand use. I prefer these SKIL Grinders over the others we have used."

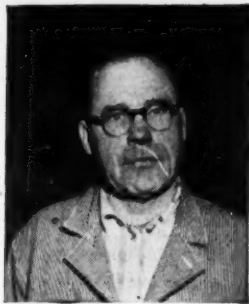
"3 year comparison tests prove **SKIL** best"

says **Mr. Lou Grundon**, president
Little Giant Crane & Shovel, Inc.
Des Moines, Iowa

Mr. Grundon knows tools and how to get the most out of them. He has orders for his Little Giant Cranes and Shovels from as far away as Serbia, Venezuela and Arabia.

"We've used 6 SKIL Grinders for 3 years in direct competition with other brands," Mr. Grundon says, "and as a result, we plan to stick to SKIL tools in the future."

"The performance of the SKIL tools has been excellent. And SKIL service has kept our production going at top speed. After trying several brands, we found SKIL the only make that gives us both performance and service."



SKIL
PORTABLE TOOLS

SKIL Products Are Made Only
By SKIL Corporation
formerly SKILSAW, Inc.

5033 Elston Avenue, Chicago 30, Illinois
3601 Dundas Street West, Toronto 9, Ontario
34 SKIL Factory Branches

You can't
buy a **better**
"soft" hammer
-anywhere!



JAW-HEAD



NEW FACES IN SECONDS!

Just loosen a nut and old faces are easily replaced. Tighten nut, and faces are in vise-like grip.

There's plenty of power cushioned in the tough, resilient water buffalo faces that give delicate parts and fine finishes full protection. And faces are easily, quickly replaced. You have a comfortable, non-slip grip with the Safety-Flare handle. Work with the best "soft" hammer — make sure it's a C/R RAWHIDE Jaw-Head.

For further information write Dept. 22

Available from leading industrial suppliers. Also C/R Rawhide mallets and Rawhide mauls.

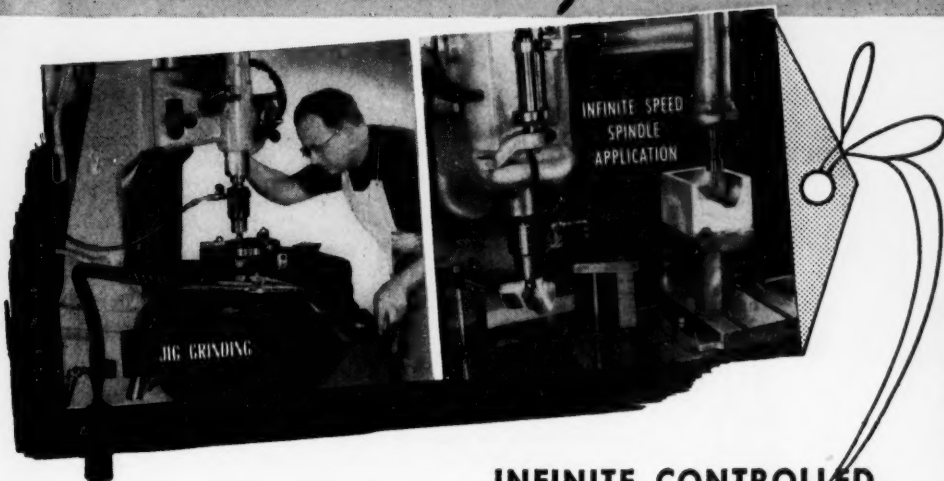
CHICAGO *Rawhide* **MFG. CO.**

1301 Elston Ave.,

Chicago 22, Ill.

In Canada: Super Oil Seal Mfg. Co., Ltd., Hamilton, Ontario

JIG GRINDING ACCURACY *guaranteed**



INFINITE CONTROLLED SPEEDS 30,000 TO 65,000 R. P. M.

Easily connect jig grinder to jig borer or mill

Then you can finish grind in hardened steel to "tenths" . . . jig grind dowel holes square with a ground base . . . move location of holes in hardened steel blocks . . . jig grind interchangeable holes in hardened sections . . . grind small holes with diamond impregnated mandrels . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . eliminate jig bushings in tools where close spacing is essential.

**Dependably accurate to "tenths"*

Other infinitely controlled air driven spindle applications

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs, or diamond impregnated mandrels.

Advantages—10 micro finishes using carbide mills . . . 5 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 3 3/4" long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.

For immediate quotation please state machine tool application. Get this manual of photos showing operations Vulcanaire performs.

VULCAN TOOL CO., Pritz and Highland, Dayton 10, Ohio



Vulcanaire

It's built by toolmakers for toolmakers

40 YEARS OF LEADERSHIP

Management and employees take pride in announcing to our many friends and customers that Eclipse Counterbore Company became 40 years of age in May. From a humble beginning in 1913 to a position of leadership in 1953, Eclipse is today truly synonymous with quality in the cutting tool industry. This healthy maturity could never have been attained without the help of those same friends and customers . . . and so to them we say "Sincere Thanks."

◀ The original Eclipse interchangeable single-diameter counterbore created in 1913.

A modern multi-diameter carbide tipped Eclipse Cutter. ▶



ECLIPSE COUNTERBORE CO.
Founded in 1913

DETROIT 20, MICHIGAN

... for today's requirements on the
larger sizes of work ...

AVAILABLE
IN 6 SIZES

30"

36"

42"

54"

64"

74"

BULLARD

Vertical Chucking GRINDERS



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Please send me a copy of the ...
"BULLARD VERTICAL CHUCKING GRINDER CATALOG" today

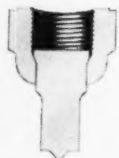
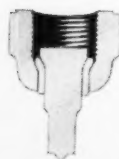
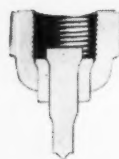
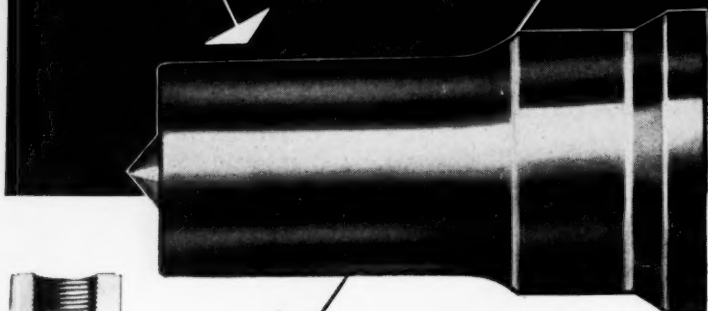
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..... cut punch *Costs*
standardize on CLEVELANDS!



You both speed production and cut costs when you adapt your punching machines to use standard tools. With the Cleveland System of Standardization the *same* coupling nut and punch stem holds a wide range of punch sizes. As shown here, sleeves are used to adapt the smaller punches of any series to the coupling nut. For instance, by the use of but two sleeves, you punch holes ranging from $\frac{3}{8}$ " to $1\frac{1}{16}$ " inclusive without changing nut or punch stem. This greatly reduces tool set-up time without reducing flexibility of operation.

Standard Cleveland punches cost less. There is no stock waste in production. Smaller sizes are made from smaller stock. They are made in quantity runs and shipped from inventory.

A-7266

THE CLEVELAND
PUNCH & SHEAR WORKS CO.
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Established 1880

..... **POWER PRESSES**

PUNCHING TOOLS & DIES

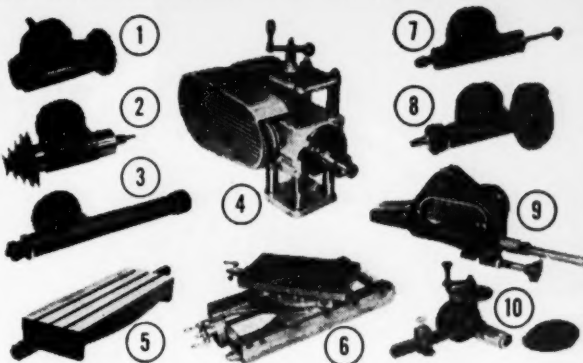
OFFICES AT:
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FABRICATING TOOLS

CLEVELAND 14, OHIO

master MACHINE TOOL ATTACHMENTS

for
**LATHES
TURRETS
MILLS**
OR USE INDEPENDENTLY



- | | |
|---------------------------------------|---------------------------------|
| 1. 90° Universal Milling Head | 6. Universal Feed Table |
| 2. Hi-Speed Milling and Drilling Head | 7. Internal Grinder Head |
| 3. Deep-Hole Internal Grinder Head | 8. External Grinder Head |
| 4. Basic Milling Unit | 9. Slotting and Keyseating Head |
| 5. Milling and Grinding Table | 10. Geared Dividing Head |



THREE SIZES

MODEL "C," 1/2 hp — 9" to 13" LATHES

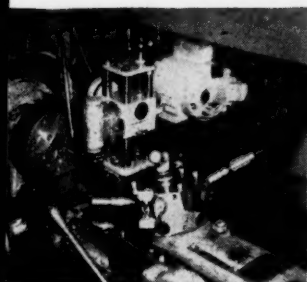
MODEL "B," 1/2 or 3/4 hp — 13" to 18" LATHES

Model "M," 1 to 3 hp — 18" to 72" LATHES

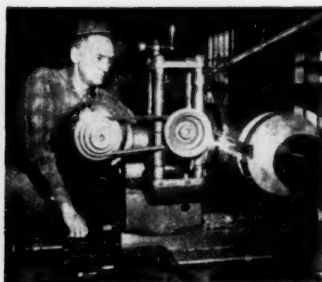
The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, boring, drilling, indexing, slotting, and keyseating, internal and external. Its full complement of equipment is an outstanding value for maintenance, repair, tool room, and

experimental shops, as well as production, thus performs a full range of shop operations at a minimum investment. These improved models are outstanding in rigidity, capacity, and simplicity of set-up and operation and incorporate the latest features developed in our 17 years of manufacturing this tool. Investigate this valuable shop tool. For the cost of one single-purpose machine, you can have several Master units producing. Prompt deliveries.

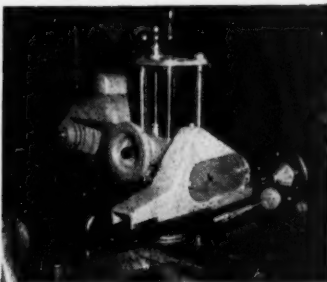
MAKES LOW-COST INDEPENDENT PRODUCTION SET-UPS — PORTABLE — SELF-POWERED



Milling on turret lathe completing part in one set-up



End Milling 2 1/2" keyway in 9 3/4" diameter shaft 22 ft. long



Master Slotting Head on lathe cutting internal taper keyway

FREE

WRITE FOR NEW ILLUSTRATED 24-PAGE CATALOG

MASTER MANUFACTURING CO.

1310 EAST AVENUE A. • HUTCHINSON, KANSAS, U.S.A.

This Tiny Tap



Surgical needle master
tap—overall length, $\frac{3}{4}$ "
—diameter, .0218"—
threads per inch, 200—
thread accuracy, lead
within .0001 over entire
threaded length of $\frac{3}{8}$ ".

Monarch
TURNING MACHINES



FOR A GOOD TURN FASTER...TURN TO MONARCH

Tells a Big Turning Story

This tiny part portrays better than words the extreme accuracy you can expect from a Monarch 10" Model EE Precision Tool-maker's Lathe. The operation detailed below was actually performed on a standard lathe which is employed primarily to turn a variety of parts for small, precision, automatic tapping and drilling machines for the user's own manufacturing operations. These master taps which he chases occasionally are needed to make a master die. This, in turn, is used to produce working taps in quantity. End use is tapping a hole in the end of surgical

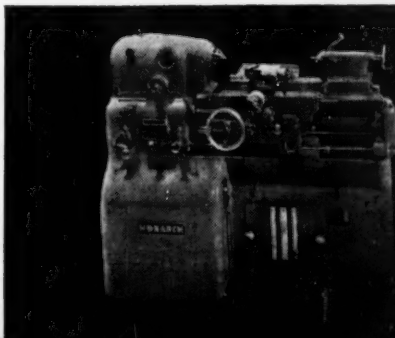
needles to permit holding of the suture.

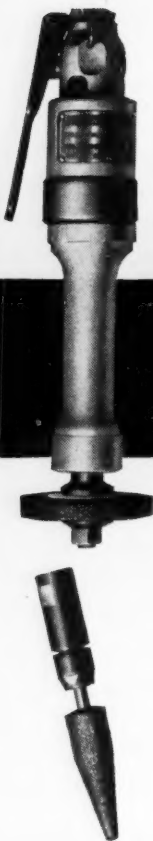
How surgeons thread the needles, we'll never know. We do know that in all probability you'll never have to work as fine as 200 threads per inch. But accuracy like this can be just as important to you, regardless. With the Monarch 10" Model EE, as a look at the listed features will at once reveal, you get a machine unequalled for precision, speed and sensitivity. Like most of the Monarch line of lathes, it can be furnished with "Air-Gage Tracer" controls... *The Monarch Machine Tool Co., Sidney, Ohio.*

MONARCH 10" MODEL EE FEATURES

- ✓ All electric drive direct to spindle through multiple "V" belts. No gears in headstock.
- ✓ A true high speed lathe for small work. Available with speed range up to 40 to 4000 R.P.M.
- ✓ Totally enclosed, automatically lubricated end gearing and gear box.
- ✓ Flame hardened and ground ways for both carriage and tailstock. Bed all in one piece—no inserts.
- ✓ American standard Camlock spindle nose—for quick, rigid and accurate chuck and fixture mounting.
- ✓ Easy, fatigue-free operation. Base design permits operator to work close comfortably. He gets production—not backaches.

- ✓ Over 6000 10" Model EE machines in use.
- ✓ The only small lathe available with anti-friction bearing taper attachment.
- ✓ For thread chasing up to 100% faster, has exclusive combination of electric lead-screw reverse and variable reverse speed control.





you've never seen
a grinder like this!

*the NEW BUCKEYE
General Purpose GRINDER*

Compact—it fits in your hand like a flashlight (and doesn't weigh a great deal more!), yet it's packed with power enough to handle many grinding jobs that formerly required bigger, heavier tools.

Designed for general purpose grinding, it takes a 2" organic wheel, but can be used with rotary files and cutters as well. Buckeye one-piece shaft construction does away with costly replacement of wearing parts.

Available in two types—lever throttle (as illustrated) or lock button throttle, these grinders are the latest additions to the Buckeye "A" Series—ounce for ounce the most powerful air tools you've ever seen.

We'll be happy to prove that—in your plant, on your work. Just tell us when and where, then you be the judge.

Available with collet adapter for mounted wheels.

What are you waiting for?

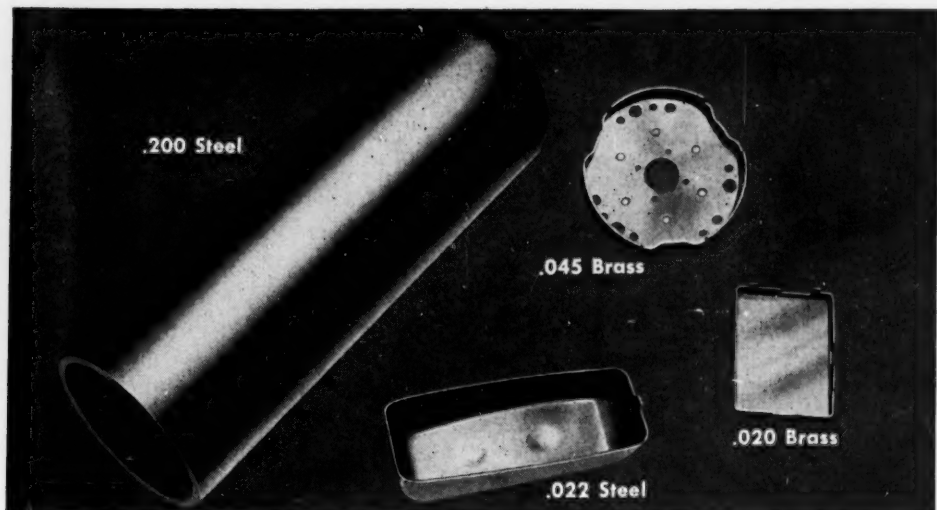
Buckeye Tools
CORPORATION
DIVISION 17 • DAYTON 1, OHIO

Portable Air
and Electric Tools
for Industry

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

ONE BREHM DIE...

USING VARIOUS CUTTING ADAPTERS



Reduces Original Cost...Cuts Trimming Costs!

When model or part changes interrupt production, only the cutting adapters of a Brehm Die need to be replaced to continue full production. Don't overlook the fact that a single Brehm Die, using various cutting adapters, greatly reduces the original investment, to say nothing of reducing current operating costs.

The Brehm "Shimmy" Die has angular cams which cause the shearing edges to cut four ways in a single press stroke. Higher production and lower costs are possible because "pinch" and slow, costly "horn" trimming operations are eliminated. Materials, thicknesses, shapes and sizes can vary. Such as gold, silver, plastic, rubber, aluminum, copper, brass, zinc, stainless or mild steel. A refrigerator door, the case of a

lady's watch, an artillery case, a business machine, aircraft or automotive part.

Perfect edges, clean, without burrs or distortion at the trimmed edge. Contours can be straight or curved, with single or multiple notches and projections.

For a free Brehm Die Catalog, write today. If you wish, and without obligation, send us your blueprint or the part for complete information or quotation.

Brehm
TRIMMING
DIES



THE STEEL PRODUCTS ENGINEERING CO.

BREHM DIE DIV., DEPT. 15, SPRINGFIELD, OHIO

Lusol OUTCOOLS, OUTPRODUCES ALL OTHER COOLANTS

You can get far greater production from your shop, and you can do it without adding a single machine or tool or man, simply by switching to Lusol. You can prove these facts about Lusol to your own satisfaction in your own plant—just as thousands of others have already done.

Lusol is a clear, all-chemical concentrate that is diluted with water and used in the coolant system of almost every type of machine tool—lathes, grinders, milling machines, saws, broaches, even rolls and presses. In each of these operations we have cases of increases in tool life as high as 500% and even higher. Less down time for tool dressing means greater production. Work stays cooler because Lusol is a super-coolant. Oilless Lusol reduces the surface tension of water so it penetrates to the very cutting

edges of the tools, keeps grinding wheels from loading up.

Workers like Lusol! A mild combination of chemicals, milder than most toilet soaps, Lusol by itself can't become foul smelling or cause dermatitis. Workers' hands, clothes and the surrounding floors stay clean and non-oily. Frequently, parts made with Lusol need not be degreased before painting, plating or assembly. While not a rust preventive, Lusol reduces the possibility of rust on parts that are stored between stages of production.



FREE BOOK

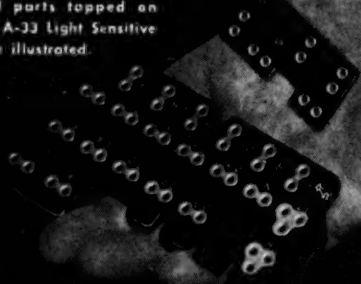
Get complete facts about Lusol by writing for this 20-page booklet. It contains information on machine cleaning, maintenance of Lusol solutions, elimination of dermatitis and odor in machines, plus many case histories of Lusol at work. Write F. E. Anderson Oil Company, 216, Portland, Conn.

for small holes in small parts

MODEL A-33

Small Adjustable Multi-Spindle Driller & Tapper

Typical parts tapped on
NATCO A-33 Light Sensitive
Machine illustrated.



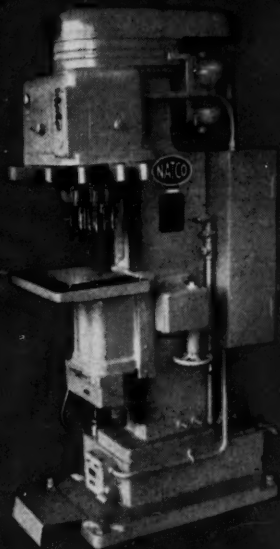
produces

2,200

parts per hour

22,000

10 x 32 tapped holes



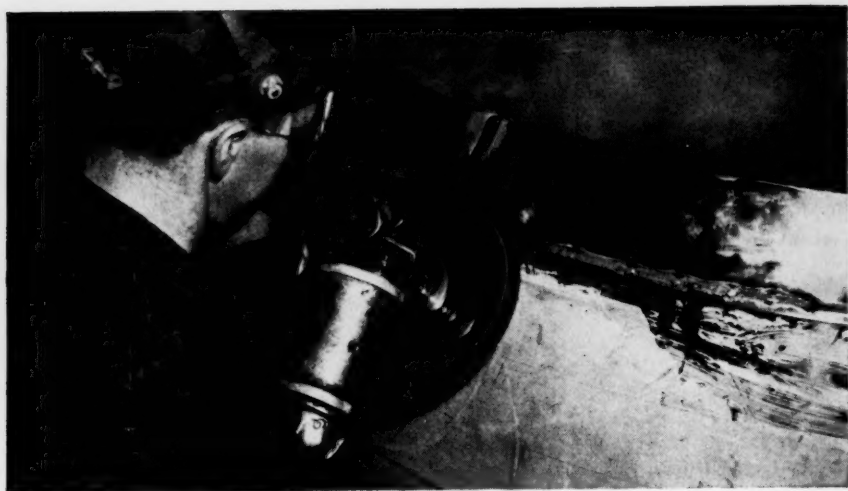
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ENGINEERED**
for Quality and
Quantity Production.



Call a Natco Field Engineer

to help you solve your problems in
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UNPARALLELED GRIP from parallel jaws

Latest And Greatest In Collet Design! Tool engineers and machine tool builders praise the Jacobs Rubber-Flex Collet as one of the outstanding developments in modern tool history. This new principle of collet construction brings you not only great improvements in gripping power, accuracy, and service life, but — *for the first time* — a collet with a full $\frac{1}{4}$ inch capacity range.

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internal grinding



no. 1309-W

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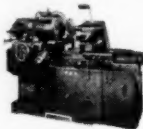
no. 1109

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3½".



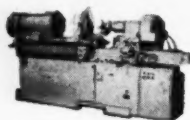
no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, ¾".



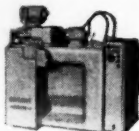
no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



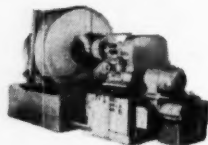
no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



no. 1209

A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".

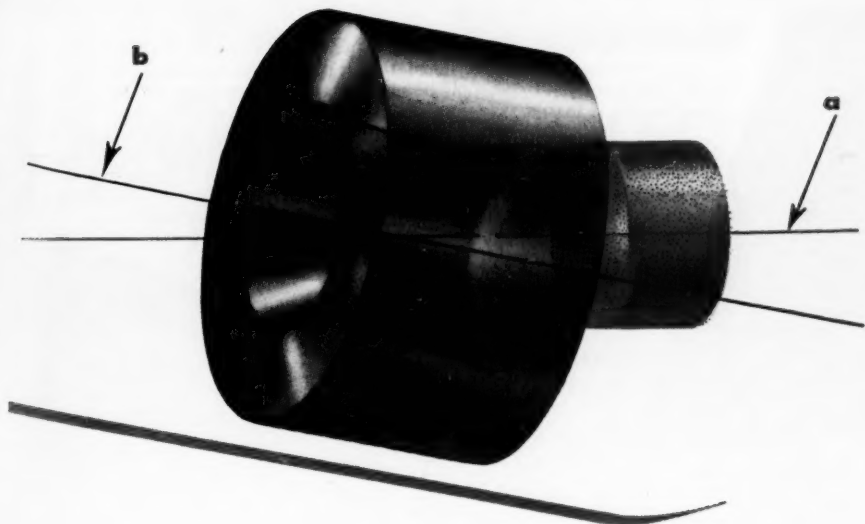


no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".



"Alignment for Better Internal Grinding", a new, sound color moving picture is available for free showing to engineering groups. Write for descriptive booking form.



BELL mouth holes are a common internal grinding error. General available information advises simply turning the workhead or changing the length of traverse to correct this error, to generate a straight hole. In the case illustrated above, where bell mouth exists on both ends of the hole, either turning the workhead or changing the length of stroke will improve the shape of the hole but will not correct the error. In the illustration, the work axis "b" is tipped out of alignment with wheel and wheel path axis "a". When the wheel, moving on axis "a", traverses the front of the hole, it grinds above the work center line and the front of the hole will be oversize. As the wheel traverses the center of the hole, the hole will be smaller. As the wheel traverses the back of the hole, it grinds below the center line and the hole will again be oversize. While the wheel contact may be a full line, it will not be parallel to the axis of the work.

The only possible remedy is to correct the alignment of the workhead axis "b" so that it will be parallel with the wheel and wheel path axis "a". Wheel wear will be uniform but, most important, the geometry of the hole will be correct.

Bryant internal grinders are engineered to permit adjustment which will bring the workhead into proper alignment.

Bryant Chucking Grinder Company

Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages

This Jig is easy to handle because it is made of aluminum (Alcoa Aluminum Tool & Jig Plate). It also costs substantially less than if it were made of steel because material costs are lower, and machining is faster.

Many manufacturers are using Alcoa Tool & Jig Plate for assembly and machining fixtures, dies for low-pressure molding of rubber and plastic, and dies for forming aluminum sheet.

Alcoa Tool & Jig Plate is a cast product, normalized, available from stock in widths $\frac{1}{4}$ " to 4". It is machined to close tolerances on both sides. Maximum size is 48" x

96". Aluminum Company of America,
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Pittsburgh 19, Pa.

**ALCOA ALUMINUM
TOOL & JIG
PLATE**



Alcoa
Aluminum



ALUMINUM COMPANY OF AMERICA

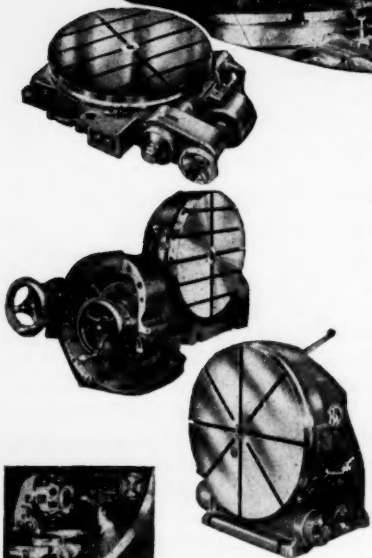
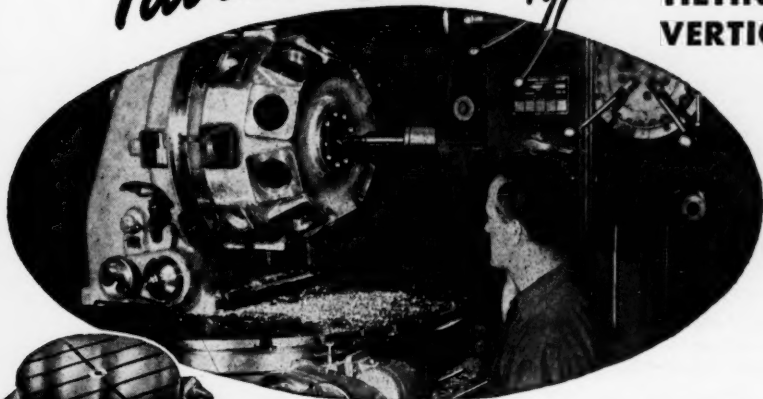
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10 inch TO 50 inch DIAMETER

3 Basic Types

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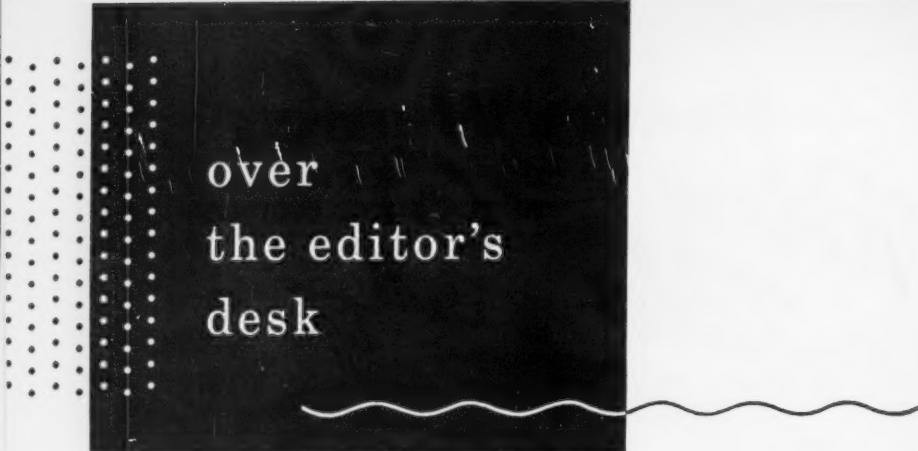
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over the editor's desk

One Quarter Century

Twenty-five years ago this month Don Gardner and Howard Campbell stood watching anxiously beside a press in a small shop in Cincinnati as the first issue of *Modern Machine Shop* was being printed. Months of planning and preparation lay behind them. The future offered a challenge to their pledge to the metalworking industry — to untiringly seek out and disseminate the best and newest ideas for the advancement of engineering skill and mechanical efficiency.

The founders of *Modern Machine Shop* were filled with unswerving faith in the future of America. Each had confidence that a pocket-size magazine, distributed without cost to shop operating executives, could render a distinct service to the metalworking industry. That thousands upon thousands of production executives today look to *Modern Machine Shop* as their one source of vital metalworking information is ample proof of the founders' foresight.

This month we begin our Silver Anniversary year and to observe this important milestone in the life of *Modern Machine Shop* we gathered together some highlights of yesteryear. These events are presented in diary form beginning on Page 128. Something extra special in the way of officially celebrating our twenty-five years is being planned for the September issue. We predict that it will be an issue long remembered by the industry.

Gage Care Poster

Not being an advertising man myself, I usually shy away from passing judgment on the work produced by this honored profession. But when an advertisement contains a goodly amount of editorial copy, as does the Size Control advertisement on page 53, I cannot repress the urge to comment. If you missed the ad, turn right now to page 53 and read it. You'll find it worth the time and particularly will you find it worth your while to send for the colorful reprint offered for posting in your plant.

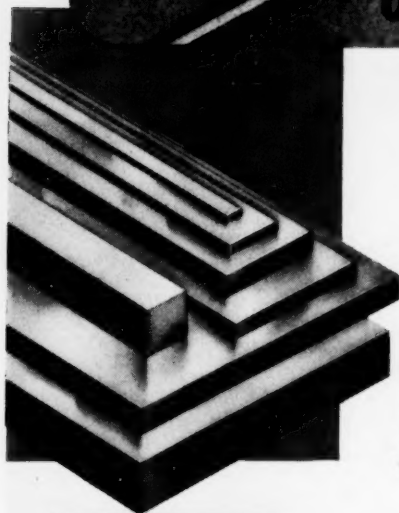
Civilian Production Upsurge

Whatever slack in business that has resulted from a drop in defense tooling is presently being off-set by the stepped-up pace of tooling for new consumer products, according to the trustees of the National Tool and Die Manufacturers Association who met last month in Washington. They reported that from a ratio of 80 per cent defense and 20 per cent civilian tooling early in March, the average in tool and die shops throughout the country, as of the end of April, was 40 per cent defense and 60 per cent civilian.

Inasmuch as the trend in basic tooling is usually a reliable indicator of what lies ahead, it would be quite safe to predict that there will be a decided upsurge in the manufacture of consumer products during the coming months.

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Simonds offers you a choice of OIL or AIR Hardening DIE STEEL, whichever is best suited to your requirements. Both types are made from Simonds own steel, are precision ground to a thickness limit of plus or minus .001" and have an extra smooth surface finish of 25 to 35 micro inches. Edges and ends are square and parallel, with all scale, decarburization and surface defects removed. All sizes come individually packaged with heat treating instructions.

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(non-deforming 5% Chrome Type) is spheroidize annealed for good machinability and uniform hardenability. Its wide hardening range (1700° to 1800° F.) makes it practically foolproof in heat-treating. Stock sizes run from ½" to 2" thick and 2" to 10" wide in 36" lengths.

SIMONDS OIL HARDENING DIE STEEL

(non-deforming Molybdenum Type) is uniformly annealed for easy machining and uniform hardening. Due to its wide hardening range (1450° to 1540°) good results are assured with even the simplest heat treating equipment. Stock sizes are available from ¼" to 3" thick and ½" to 14" wide in 18" lengths. The heavier sizes also come in 36" lengths.

Try a bar on your next job. Your Simonds Distributor carries many sizes of both types in stock—call him right now.

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WRITE FOR CATALOG

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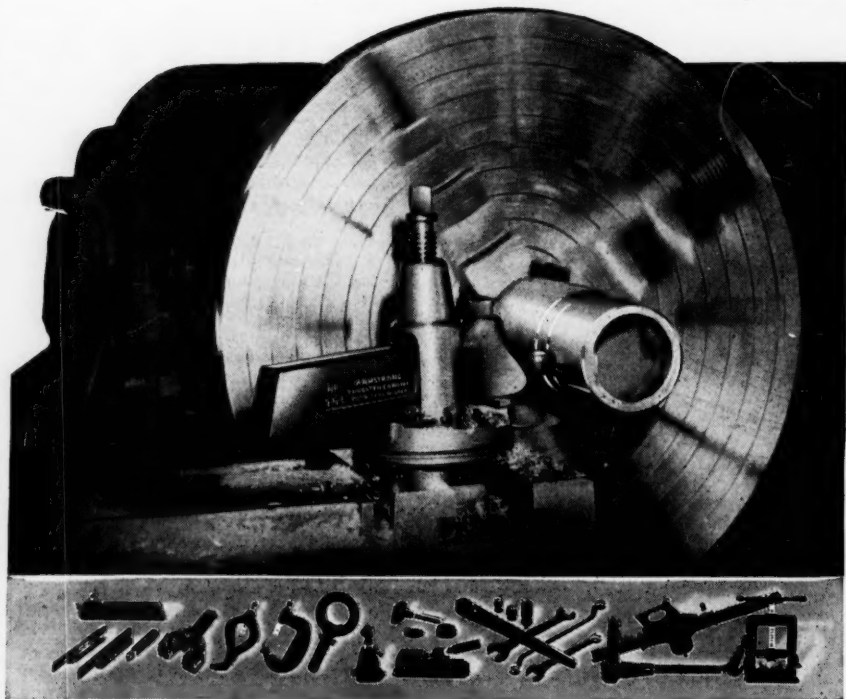
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MODERN Machine Shop

Vol. 26, No. 1
JUNE, 1953

features
in this issue

Sampling and Testing Titanium

By Robert B. Stanton

Titanium fabricating problems have been reduced to a minimum at Consolidated Vultee Aircraft Corporation since a procedure was adopted involving inspection and sampling of bars, sheets, and strips obtained from various suppliers. Page 136.

Case History No. 5—Machining Stainless Steel

By G. J. Stevens

The author offers a solution to a problem encountered in the manufacture of small screws in a B & S automatic. Page 139.

How Hard is Hard?

By Howard E. Boyer

In which the author explains a "laboratory" concept of hardness testing for the benefit of shop personnel who are responsible for the inspection of parts and materials. Page 140.

Treatment of Edges of Fabricated Sheet Steel

By Fred Rogers

This article covers twenty methods recommended for finishing off rough edges of various thicknesses of sheet metal. Page 150.

Solving Stainless Steel Fabricating Problems, Part II

By Lester F. Spencer

Drawing and bending operations are discussed in this concluding article. Particular emphasis is placed upon the experiences of the author in his own plant. Page 164.

Die Maintenance

By A. Peterson

This article is specifically concerned with the die alignment phase, pointing especially to the use of standard die sets without regard to design requirements. Page 188.

Gaging Broaches by Optical Projection

By B. G. Lawrence

In which the author tells how optical gaging makes possible the checking of all teeth of a broach for tooth form, spacing, and wear for the entire length of the broach. Page 196.

Special Setups for Pantograph Profiling

By John E. Hyler

The author discusses two interesting master setups for profiling intricate workpieces. Page 200.

Calculating Screw Size for Press Tool Construction

By Federico Strasser

A description of a simple method for determining the proper size screws to use in assembling punch and die units. Page 204.



Serving the Metalworking Industry for Twenty-Five Years

1928 - 1953

*The following are excerpts taken from the diary of
Modern Machine Shop.*

1928

What is so rare as a day in June? . . . After many months of planning and preparation, Don G. Gardner and Howard Campbell have put me in print. They're calling me Modern Machine Shop and sending me to more than 20,000 shop operating executives. I'm happy they decided to make me pocket size. Big things come in small packages. I'm rather proud, too, of my editorial content—29 pages packed full of top-notch ideas. In the coming months, I plan to have a lot of articles on machining operations in automotive and household appliance plants, railroad and welding shops, articles on jig and fixture designs, materials handling, heat treating, personnel training, inspection, and so on. Almost overlooked a story on a material called Carboly. Predict a great future for this material.





Just when I was getting off to a good start, something called a Stock Market met with an accident. A lot of people were hurt but I haven't felt the effects of it yet. My friends have a lot of confidence in me. Gave me 720 pages of advertising this year. To show my appreciation, expanded my circulation to 27,000 copies. Attended Second National Machine Tool Builders' Exposition in Cleveland on September 30. Some people told me about the first Exposition back in '27. Over 10,000 attended. Must be a great organization to attract that many people.

Been hearing a lot of talk of unemployment. Some people are saying that that Stock Market deal of last year is causing it. Saw where General Electric inaugurated an unemployment fund plan. Hope they can discard it soon. "Boss" Kettering made the statement: "If you do not like to travel at the rate at which you have to travel, step out of line and be a good spectator and adviser of those who want to stay in the race." Wonder how long he will be around. Seems like people want to work for me. There's George Meyers in Chicago now. Lot of friends telling me how much they liked series of articles that Mr. Campbell bought from Frank Curtis entitled "Modern Tooling Practice."



No one seems to be able to find the answer to this problem of unemployment. Trying my level best to give readers information that will help them do their work a little better, but jobs are getting more scarce. The boss visited dozens of shops in search of best editorial material available for me. Was very pleased with myself to have article by A. H. d'Arcambel entitled "Machinability of Metals." Had several nice articles on building the Intertype and machining parts for Wasp and Hornet engines. Wonder if many of us will ever do much traveling in the air.

Awfully hard to keep my spirits up. Been suffering from a cyclical malady that economists for years have been trying to find a remedy for. Thought for a while I wouldn't be able to survive,

1929

1930

1931

1932

1933

but new doctor in White House promises new antidote having remarkable curative powers. Sounds like it's going to cost a lot of money per treatment. Two men joined me to help fight off my depressed feeling— John M. Krir.gs and Granville M. Fillmore. Began to feel better as soon as they arrived. Enjoyed telling readers about new material called Oilite which Amplex Manufacturing Company developed. Spent a lot of time talking about Hamilton watches.



Hope I never see another year like this again. Wonder if people twenty years from now will ever say that these were "the good old days."

1934

Feel like I've been confined in some deep dark cave and just beginning to see a glimmer of light at the entrance. Have been using a symbol on the masthead called NRA to scare away the evil spirits. Saw the World's Fair in Chicago during August. What a wonderful age I'm living in. Man by the name of C. W. Hinman sent me some articles. He certainly sounds like he has a lot on the ball and I hope he will continue to send material. Seem to have hit the jackpot in C. L. Szalanczy. Had many requests for reprints of his article "Punch Press Operations and Tools." Business must be getting better. Mr. Gardner and Mr. Campbell, my bosses, moved me from my birthplace to larger quarters at 704 Race Street. Welcomed Norman S. Rogers to my staff to handle art work.

1935

Hitting my stride again. Took time out to visit the National Machine Tool Builders' Association Exposition in Cleveland on September 11. Saw 3 million dollars worth of machine tools on display. Predict a Show like this will put Mr. Depression out of business. Used trusty rifle to shoot NRA eagle and found bird too tough to eat. Buried him in backyard and set out jasmine tree to mark the odorous burial spot.



1936

Wonderful year. Seemed to have recovered from illness which started a few years back. Putting on more weight—not fat, muscle. Circulation hovering around 27,000 mark. Those articles on machining operations in the transportation field, like the building of stainless steel railway cars at Budd and

ships at Newport News, indicate that this country is getting into high gear again. Glad to see Gene J. Schwarber join me. Looks like he would make a swell advertising manager someday.



Blue skies. Carried more pages of advertising per issue, on the average, this year, than any other industrial publication in America. Advertisers seem to like the company I keep. Outgrew former home and had to move to larger quarters at 431 Main Street. Nice setup here with good possibilities for further expansion. Saw where James F. Lincoln Arc Welding Foundation made awards totaling \$200,000. Wonder why some firms are busy on a few ordinance projects. Was most happy to have Robert I. Shore join me. Wish I could find more men like him.

Visited first American Society of Tool Engineers Show in Detroit on March 9. Many people commented how much help I've been to them. Modestly explained that was my job. Added new department called "Modern Equipment at Work" . . . another helpful service for operating executives who want to keep up with newest developments in the field. One of the auto manufacturers gave me a lot of info about Superfinish. Friends Warner & Swasey told me they had produced 50,000th turret lathe. Lucky break, George E. Hay signed up to play on my team.



Enjoyed telling my readers about wonderful things on display at World's Fair in New York . . . lots of new household appliances and new model cars. Hope to take a ride on one of those streamlined trains someday. Curious about this windowless plant that Simonds Saw & Steel is building. Made extensive preparation for trip to Cleveland to attend Machine Tool Builders' Show and then got word that Show was cancelled. Whoever said "clear as crystal" should try looking into a piece of the stuff I have that's in the shape of a sphere. It was okay until September when it suddenly became cloudy. Must be caused by that trouble that started in Europe. Hard to predict what outcome will be.

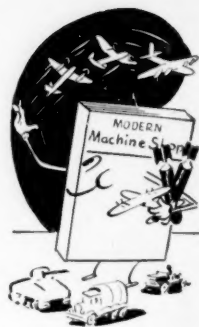
1937

1938

1939

1940

Had a number of excellent articles on aircraft production and ordnance items. The boss sent me into more plants this year than ever before. Seems like I've got more important job to do than ever before, too, helping to get a defense production program rolling. Came through with most helpful series of articles, one entitled "Tool Steel for the Non-Metallurgist" by H. E. Replogle, and another "The General-Purpose Use of Carbide Tools" by James R. Longwell.

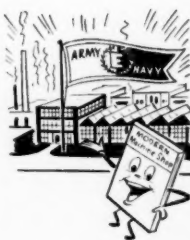


1941

Defense production jumped right into war production. All of us can't shoulder rifles, but we can help to win the war in many other ways. Noticed there weren't enough men around to do the job so I began to help train women workers. Somewhat of a headache at first. A gal by the name of Rosie who started in on a riveting job brought a lot of her cousins into the shops to operate even the most intricate pieces of metalworking equipment. Devoted quite a few of my pages to shipbuilding, ordnance and aircraft articles. George Hay asked for leave of absence to join the Marine Corps. Reluctant to see him go but his country needs him more than I do. Added Richard S. Kline to my official family.

1942

Never knew demands of a war could be so great. Practically all plants I went to this year were operating three shifts. Gave readers with conversion problems plenty of sound advice. Assisted on manpower shortage problems with articles on apprentice training. A peace-loving country is certainly in an awful mess when it starts putting things together to fight a war. Wish someone could figure out a way to either prevent wars or else find a better method of converting peace time production to war.



1943

Minesweepers, tanks, marine turbines, 90 mm. guns, cartridge cases, bombs, aircraft, and so on. Covered about every type of war production this year. Worried somewhat over rate at which some materials were being used. Explained situation in articles on conservation. Visited both the ASTE War Production Show and ASM War Conference Display. Metalworking makes a lot of progress during

war time. Wonder if peace time products will ever be made in as great a quantity as some of these war end items. Watched Dick Kline take off for the "Wild Blue Yonder." Happy landing and hurry home.

Understand quite a few of those landing barges, tanks, and pieces of artillery I had been discussing put in their appearance on the beaches at Normandy. Wish I could have seen those planes equipped with the superchargers made in GE's Fort Wayne plant go after the enemy planes.



Peace at last. Quite proud of job I've done in helping America to build the greatest production machine the world has ever seen. Before President Truman issued the order for use of the atom bomb, I never saw anything quite like the development in aircraft. Those stories on building flying boats, tooling for P-38 production, B-29 maintenance, and so on, were most avidly read. Probably bigger job lies ahead now that war is over. Lot of rebuilding and conversion work to do. Have an idea I'll be telling many stories about this new source of energy called atomic.

Spent most of my time giving information regarding adjustment to peace time production. Found many workers in plants where I'm sent reluctant to give up high war-time wages. Note that they are pressing for more wages for less work. Observed that fair solution would be increased pay based on increased production. Sorry to say, observation lost among strikes and threats of strikes. Happy to have more help once again. A distinguished trio of veterans, Marine Hay, Air Corps Kline, and Army Schwarber, have returned.

Labor problems still hampering production. Went to see the sixteen million dollar exhibit of machine tools at the Dodge-Chicago plant. Considered exhibit important enough to devote entire content of one issue to it. Found this kind of effort rewarding. Some men who get me just can't take time away from their work to see exhibits like this in person. I reported on just about everything that



was on display. This year brought a sad experience into my life, the death of Don G. Gardner. It was Don, as I affectionately called him, who, with Howard Campbell, brought me into this world, gave to me of his time, talent, and experience, charged me with the worthy mission of helping others to help themselves, patiently watched over me through struggling infancy, and proudly beamed when I became a success. Mr. Campbell became my business administrator and called for the services of Fred W. Vogel to assist in feeding my enormous editorial appetite.

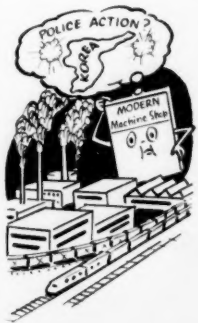
1948

Highlight this year was my "Freedom" issue. Pointed out unlimited opportunity of advancement for workers who labor in a free economy. Cited many specific examples and used several contemporary business organizations as basis for proving point. Where men are free to develop their own ideas, production flourishes. Gave Robert Shore the job of editing my New Shop Equipment section. Asked Robert Walker to represent me out on the West Coast.



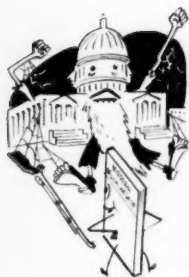
1949

Labor problems still vexing many of my readers. Obtained services of Dillard Bird, an expert in the field of management problems, who prepared series of articles entitled "A Philosophy of Human Relations." Readers told me they found "Practical Pointers on Steel Treating" by W. R. Bennett most helpful. Visited Vermont Machine Tool Builders' Show in September. Hard to find better skill and machine tool building know-how than you see in these New England plants. Published several articles sent to me by a man by the name of Gilbert Close. Said to myself here's a man with his hand on pulse of West Coast production activity.



1950

United States involved in fracas called a police action . . . looks more like war to me from appearance of industrial activity. Noted growth in applications of induction heating. Intrigued by use of X-ray microscope in metallurgical examinations. Explained in detail a new metal forming process called Marform. Happy to have Duncan W. Barton join me.



Many of my readers confronted with new and complex production problem. They were called upon to produce unlimited amounts of civilian items and at the same time a sufficient amount of war material for fighting the war in Korea. Heard quite a bit of criticism about a machine tool shortage. Actually, it just took some people in Washington a long time to wake up to the fact that military equipment and supplies can't be produced without machine tools. Lost no time telling readers how to process parts made of high temperature alloy materials, especially those used in jet airplanes. In the civilian production line, found production of automatic transmissions a rather pleasant subject to discuss. Noted offspring of atomic energy in evidence in "Isotopes at Work."

Longest police action on record. Devoted many pages to aircraft production, also tank engines. Mr. Campbell hinted several times that he was getting tired, also that he was getting too far behind with his fishing. Not until I saw him pack his bag with an assortment of lures and purchase a one-way ticket for Vero Beach, Florida, did I consider his hints seriously. We had spent twenty-four years together. Found it most difficult to bid him farewell. Assured me that Fred Vogel would take good care of me.

Plan to celebrate my twenty-fifth birthday this year with something rather special in September. Plans call for devoting the entire issue to . . . sorry, I forgot I haven't been given permission to say too much about it yet. It's in the works though, and before very long the details will appear on some of my pages. Feel wonderful celebrating twenty-five years of service to the metalworking industry. My success has been due largely to the loyalty of my many friends who read my editorial material and refer to me when making purchases of new tools and equipment, to the loyalty of my many advertisers without whose support I cannot exist, and to the loyalty of the staff and contributors whose untiring efforts make me what I am today—Modern Machine Shop, a practical magazine doing a job for the busy production executive.



Sampling and Testing Titanium

By ROBERT B. STANTON

In which the author discusses a practical receiving inspection and sampling procedure developed by Convair for titanium bars, sheets, and strips.

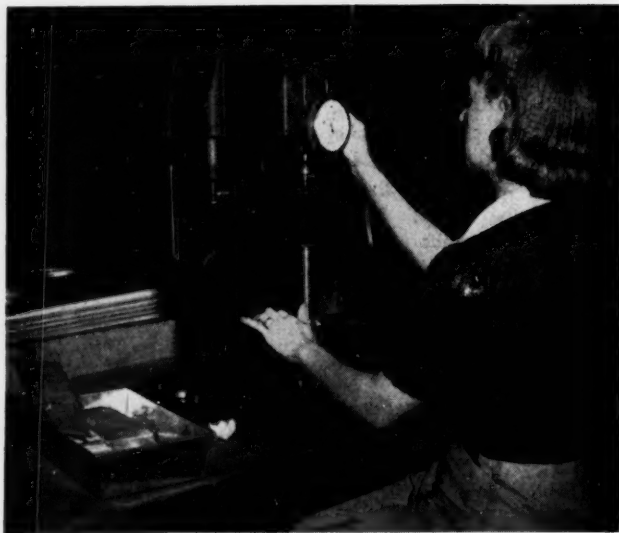
MANY of the processing difficulties that have retarded the use of titanium in the western aircraft industry are attributable not to the inherent deficiencies of the material, but to a lack of knowledge regarding the compositions and properties of titanium stock procured from different producers of raw materials. Therefore, it is believed that an important step forward has been taken at Consolidated Vultee Aircraft Corporation, San Diego, California, in the development of

a practical receiving inspection and sampling procedure for titanium bars, sheets, and strips.

The initial step in this procedure involves the preparation of receiving reports by the material department when individual batches of stock are received. Such reports identify the stock with reference to the conditions and dimensions of the materials at the time of delivery.

Receiving-report data are next compared with applicable procurement

specifications, vendors' certified affidavits of chemical and physical analyses, and so on, by Convair inspection personnel. Then, if discrepancies are



Rockwell hardness testing is one of the three basic sampling operations that are used to ascertain the uniformity and quality of titanium stock materials procured by Consolidated Vultee Aircraft Corporation, San Diego, Calif.

Specimens from each batch of titanium materials are tensile tested by Convair's engineering test laboratory with the equipment shown here.

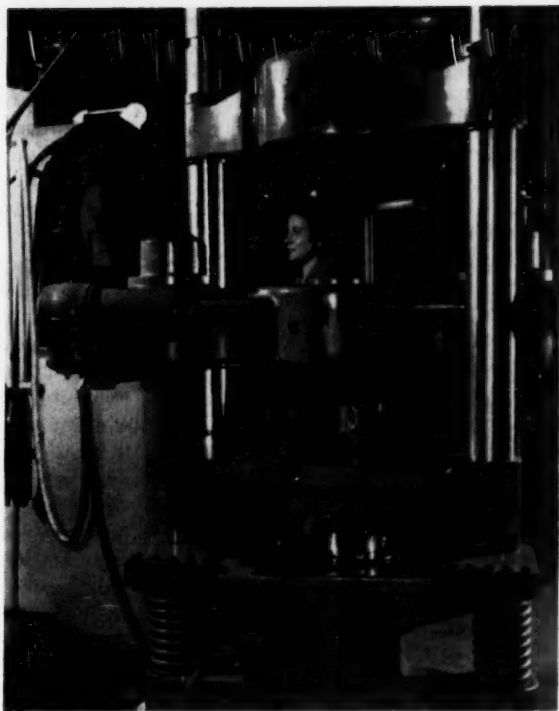
observed, all paperwork is referred back to the material department for clarification prior to the acceptance of any given shipment.

If no discrepancies are observed in the paperwork, or if discrepancies are found to represent mistakes of no apparent significance, inspection personnel select typical specimens of each batch of stock for sampling operations. Such specimens are taken from each lot of materials with the same composition, thickness, and temper as follows:

Lot Quantity	Number of Samples
5 or less sheets (or bars).....	100 per cent or 3, whichever is smaller
6 to 10 sheets (or bars).....	4
11 to 25 sheets (or bars).....	5
25 to 50 sheets (or bars).....	6
Over 50 sheets (or bars).....	6 plus 1 for each 50 or fraction thereof.

No transverse specimens are taken from materials having a width of less than 9 inches. Otherwise, specimens must be cut so that they will respectively be both longitudinal and transverse to the direction of finish rolling. For example, where two bend test specimens are required, one must be longitudinal while the other is transverse.

A steel stamp on each specimen indicates the direction of rolling or lon-



gitudinal grain direction. Paper tags are also attached to the specimens, so that they can be readily identified before and after they are tested.

Properly identified specimens are machined and otherwise processed like conventional steel specimens prior to sampling operations in Convair's engineering test laboratory. Then—following tensile, bend, and Rockwell-hardness tests—the engineering test laboratory sends a material data report to the inspection department. If the latter report shows that the materials meet minimum specification requirements, the stock from which the specimens were taken is considered acceptable.

Where an original test specimen fails

to meet specifications, a check specimen is prepared and tested; and, if the check specimen is also unsatisfactory, the stock from which it was taken is referred to Convair's material review board for appropriate action.

Electric Control Systems. By Richard W. Jones. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 511 pages. Cloth binding, board covers. Price, \$7.75.

With this volume, the author effects a transition between more elementary books on electric machinery and those giving a more advanced analysis of feedback control. Several features combine to achieve an integrated coverage of electric machinery, electronics, circuits, and transients. Most of the book is concerned with control systems having no feedback, but the

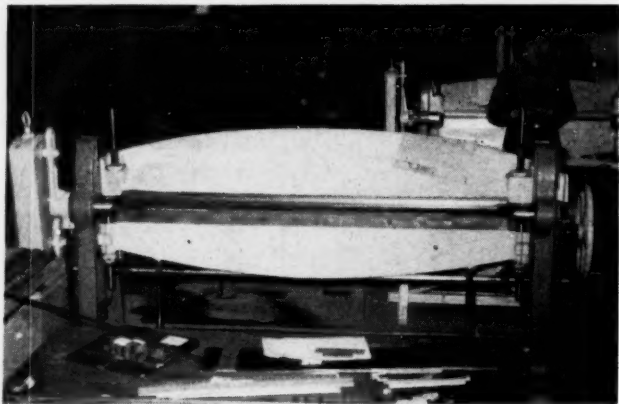
fundamental concepts of feedback are introduced and the operation of a few feedback controllers are analyzed. The book covers power amplifiers of both the dynamo-electrical and magnetic types, develops the concept of transfer functions, and presents the study of problems associated with relay or binary switching circuits. Emphasis is also placed on the system aspects of the control problem.

Chapter headings include dynamics of the motor and load; d.c. and a.c. motor characteristics; electromagnetic contact-making devices; gaseous electronic switching devices; electronic switching circuits; and motor acceleration, braking, and protection. Other specific topics covered in the book are power amplifiers, control circuit fundamentals, basic motor circuits, speed control, and speed control with auxiliary power converters.

Japanese Hand Bending Brake

THE Japanese bending brake illustrated herewith differs in certain design features from American brakes. One point of difference is that the die, or clamping bar, is actuated by means of a hand, or "set," wheel-sprocket chain-gear combination. The clamping bar is mounted horizontally, and its action in closing is vertical. This arrangement makes it possible for one operator to place a piece of sheet metal in the machine and then close the clamping bar on the sheet. Since the operator can close the clamping bar slowly, exercising "finger-tip" control, and since the motion is very

smooth, there is no tendency for the metal in the brake to move or "jump." The vertical clamping system keeps the clamping bar flat and makes possible forming of very small edges, since the metal is clamped uniformly all along the bar surface. The apron or bending leaf is provided with a smooth-acting counterbalance.



Case History No. 5

Machining Stainless Steel

By G. J. STEVENS*

Problem

A certain shop was making small screws in a B & S automatic from $\frac{1}{2}$ -inch and $\frac{5}{16}$ -inch diameter Type 416 stainless steel centerless ground stock. It could not be machined satisfactorily.

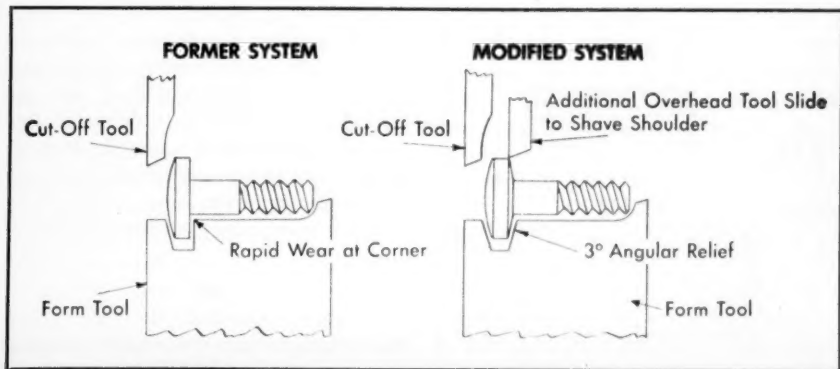
Solution

The particular machining engineer who investigated the trouble studied the operation and found that the ma-

chine was being operated on the high side of the machining range (160 f.p.m.). A wide form tool also was being used, and it was not ground with the correct top rake angle. He advised a 7 to 10-degree top back rake and a modified form tool for improving tool life.

Setups with wide form tools frequently cause trouble in machining centerless ground stock. The reason for this is that the wide form tool builds up high tool pressures before starting to cut. The use of cold drawn stock usually helps to overcome this difficulty.

*Machining Engineer, Armco Steel Corp.



How Hard is Hard?

By HOWARD E. BOYER*

The author explains a "laboratory" concept of hardness testing for the benefit of shop personnel who are responsible for the inspection of parts and materials.

THE term hardness is used freely in most metalworking shops as though it were a term which had a definite meaning and was something which could be measured accurately and evaluated on a standard basis. Actually, nothing is further from the truth, which is not unusual when neither the dictionary nor the physics books attempt to present a clear-cut definition. It has become generally agreed among physicists and metallurgists that hardness is not one property distinct in it-

self, but more of a combination of properties. Dr. L. B. Tuckerman of the National Bureau of Standards defines hardness as "a hazily conceived conglomeration or aggregate of properties more or less related to each other", while the more commonly accepted idea of the metalworking industry is "resistance to permanent deformation".

Dr. Tuckerman elaborates on his description and includes in the scope of hardness properties such varied attributes as resistance to action of abrasives, resistance to plastic deformation, high modulus of elasticity, high yield strength, high tensile strength, absence of elastic dampening, brittleness, lack of ductility or malleability, high melting temperatures, magnetic retentivity, and others. Reference to this rather complex explanation is not intended to confuse, but to point out the fact that hardness is a combination of many other properties which may vary independently from each other. It is obvious, when one considers the above

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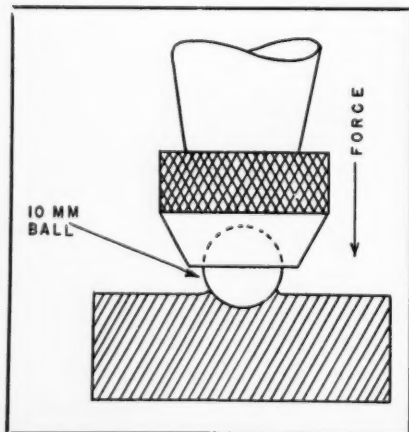


Fig. 1—Diagram illustrating method of making Brinell hardness test.

facts, why there is a definite lack of any standard definition and subsequently a variety of methods which attempt to evaluate this poorly understood property.

There is, however, some standardization relative to the meaning of the term hardness in the metal working industry which is: the resistance of a material to indentation. Even this definition is grossly inadequate to cover the entire field unless one considers the technique of making the indentation and evaluates results accordingly. The definition might stand reasonably well and give a standard of evaluation if all metals were strictly homogeneous, but unfortunately this is far from true.

Most pure metals are considered homogeneous and many alloys, at least under certain conditions, are reasonably homogeneous, but by and large most of the alloys are not only complex in their chemical composition, but are likewise complex in their physical make-up. This holds true particularly in the instance of the iron base alloys, which are by far the most important group of alloys in use today.

All of our common steels and cast irons are composed of at least two constituents in their microstructures and most of them are composed of more than two. These various microconstituents possess widely different properties including hardness. For example, in ordinary annealed cast iron the graphite carbon, which is one of the constituents, might be considered as having no measurable hardness while carbide particles may also be present which are sufficiently hard to scratch glass. Therefore, it is easy to understand why an ordinary indentation hardness test may or may not be of any particular value in predicting the

behavior of metals during fabrication or in their subsequent service life.

It should not be inferred, at this point, that the indentation hardness is being pronounced worthless or even criticized, for such is by no means the intention in any part of this article.

Fig. 2 — Illustration showing diamond cone method of indentation testing. "A" represents depth caused by minor load and "B" represents depth of indenter after applying major load. Illustration courtesy Wilson Mechanical Instrument Company.



The intent is primarily to promote a more widespread understanding relative to the meaning of the term hardness and how it may be evaluated more accurately and the information employed to greater advantage in shop practice.

The history of hardness testing dates back to at least 1722 when Reaumur introduced the scratching bar method. The Mohs Scale of testing hardness was introduced in 1822, and has been and still is used for testing minerals, though it never served any practical purpose to materials engineers and metallurgists. Various methods of scratch testing have been used over a period of years, though most of these have been employed on a laboratory basis only. Even the scratch test may be considered as a modification of the indentation test.

The popular methods of testing by indentation are generally divided into

two different classes as they are used in practice today. In many cases these two methods correlate closely and in other instances they do not, depending upon several factors. The first method consists, in principle, of impressing an indenter of some pre-es-



Fig. 3—The Normal Rockwell Tester. Illustration courtesy Wilson Mechanical Instrument Company.

tablished shape onto the surface of the material being tested and then calculating the hardness by measuring the size of the indentation by means of a suitable microscope. The second principle consists of impressing an indenter onto the specimen surface, also with a constant force, and subsequently calculating the hardness by measuring the depth of the indentation. In the instance of the first method the smaller indentations show a higher hardness and likewise by the latter method the shallower indentations in-

dicate that the material is more resistant to deformation and is thus declared as being harder.

The first method, belonging to the former type mentioned above, was the Brinell Test introduced about 1900 by Dr. J. A. Brinell, a Swedish Engineer. This relatively simple test consists of applying a constant load, usually 500 or 3000 kilograms on a hardened steel ball 10 millimeters in diameter to the flat surface of the specimen. The load is held constant for a few seconds after which the recovered indentation is measured in millimeters. The Brinell hardness number is then calculated by dividing the load applied by the surface area of the indentation according to the following formula:

$$\frac{L}{\frac{\pi D}{2} \left(D - \sqrt{D^2 - \text{Minus } d^2} \right)}$$

L equals load in kilograms

D equals diameter of ball in mm.

d equals diameter of indentation in mm.

Figure 1 shows how this test may be performed. The force may be applied in various ways although it is usually accomplished by means of hydraulic pressure. The load is selected in accordance with the type of material being tested. That is, relatively soft metals, such as aluminum, are usually tested by means of the 500 kilogram load whereas a harder material, such as the iron base alloys, are usually tested by means of the 3000 kilogram load. The primary idea is to obtain an impression which is large enough to measure accurately and yet one which is not too deep or has an excessive amount of extruded metal around the indentation. Figure 1 shows how this

condition could easily affect the test.

In spite of the many advantages offered by the Brinell method of testing hardness and the important role it has played in the metalworking industry its use has been automatically limited by three distinct factors: (1) Size and shape of the work to be tested due to the relatively large indentations; (2) These large impressions frequently constituted a destructive test, thus precluding its use except as a spot check; and (3) Most important of all, the range of hardness which can be accomplished by this method. In general, it becomes impractical and tends to produce inaccurate results to attempt tests on material which shows an indentation less than about 2.75 mm. in diameter with a 3000 kg. force (Brinell Hardness Number 495). Some other method must be employed for testing materials above this range in hardness value.

The Rockwell Test, introduced by Stanley P. Rockwell in 1919 is by far the most widely known and used hardness test in industry today, due mainly to the wide range of hardness testing it can accommodate. Its relatively high degree of accuracy, along with its simplicity and speed of operation also account for the widespread popularity of the instrument used. The tester operates in accordance with the second principle described above; that is, measuring the depth of an indentation made from a constant force. This method sounds simple enough, and possibly would be if it were not hampered by minute surface irregularities.

Mr. Rockwell mastered this problem by the unique method of first loading the indenter with a constant load of 10 kg. known as the minor load, and

then adding a major load of 60 to 150 kg. Figure 2 illustrates the diamond cone type of indenter used in this instrument which is capable of testing a wide range of materials varying from the softest non-ferrous metals to fully hardened steels. Figure 2 depicts the two-step principle of indentation briefly described above. Figure 3

DIAMOND PYRAMID VALUE	APPROXIMATE ROCKWELL "C" VALUE
1865	80
1710	78
1556	76
1400	74
1245	72
1076	70
942	68
854	66
789	64
739	62
695	60
655	58
560	56
534	54
509	52
484	50

Fig. 4—Tabulation showing a portion of the conversion table for the purpose of comparing Rockwell "C" and Diamond Pyramid Numbers.

shows a picture of a Normal Rockwell Tester which is capable of being used with three different loads and several different indenters including both the diamond cone and steel ball types.

The Rockwell "C" Scale has become the most popular scale for evaluating hardness in this country as of today. This test involves the use of the Normal Rockwell as shown in Figure 3, employing the 150 kg. load which is impressed upon a diamond cone. This cone, such as shown in Figure 2, was developed as a result of a great deal of experimentation. The 120 degree diamond with a 0.2 mm. radius was

finally selected and has remained standard. Since this treatise is not intended as a discussion on hardness testers no further description of the instruments will be attempted.

A great many engineers and other individuals around a metalworking



Fig. 5—The Tukon hardness tester. Illustration courtesy Wilson Mechanical Instrument Company.

plant have come to regard the Rockwell "C" Scale as the standard of all hardness testing so that it is not unusual in mentioning a hardness value to have one of them say: "What would that be in Rockwell 'C'?" This scale is used most frequently in specifying hardness value on engineering drawings. In fact, it is frequently used inappropriately, due to the fact that it

has become so widely known. The demand for a more sensitive instrument which could be employed for the testing of thin strips or sheets and thin cases brought forth the Superficial Rockwell. This latter instrument operates on the same general principle as the Normal Rockwell except that the loads are lighter. Similar indenters are used in the Superficial Machine; that is, a diamond cone for harder materials and steel balls of different sizes for the annealed steels, non-ferrous metals or even plastics. The major loads applied with this machine may be 15, 30, or 45 kilograms. It is also possible to use this Superficial instrument for making the Vickers Test which will be described later.

Many other means of evaluating hardness have been developed and some of them are and probably will continue to play important roles in the metalworking plants, although most of these serve a limited range of application. Many of them are strictly comparators and are used as a means of rapid inspection usually at some sacrifice in accuracy.

It might be construed at this time that the hardness test is made easily and quickly so that all the books and articles written on the subject are hardly warranted. It is true that the test is easily performed, but proper interpretation of the results becomes far more complex.

Since hardness is not one property in itself, but a combination of many other properties, hardness testing is usually done in order to evaluate one or more other properties. For example, in the instance of heat treated steels, the very purpose in heat treating is usually to obtain certain mechanical properties. Obviously, parts cannot be

destroyed to make tensile or impact tests so hardness tests are performed which can be employed for predicting these other properties. Tensile strength, in particular, can be predicted quite closely if accurate hardness results are available.

Actually, when one considers the definition of hardness it might be stated that hardness tests are never used to determine hardness alone, because there is no such single property. Hardness is probably more often associated with resistance to abrasion or scratching or, in other words, resistance to wear. It is generally assumed that the higher the hardness by indentation, the greater the resistance to wear. To a great extent this is true providing the indentation tests are correctly made and interpreted. Unfortunately, this is the phase which is often poorly understood; consequently, results are grossly misleading. In most instances, resistance to wear is directly dependent upon microstructure. In turn, microstructure is usually dependent upon composition and heat treatment. Therefore, the normal indentation hardness test such as made by the Brinell or Rockwell, reviewed in the foregoing, may or may not be indicative of the real hardness or wear resisting characteristics. Under best conditions such tests are comparative and when different microstructures are involved the readings cease to be comparative even though the readings may be identical.

Tool and die makers, or other members of the metalworking industry who have long depended upon the test file as a means of evaluating hardness of their tools are actually not far wrong in principle. Oftentimes the test file reveals conditions which are not regis-

tered by the normal indentation hardness test. In other respects, of course, a file is hopelessly inadequate for it reveals nothing relative to the depth of hardness.

Due to the recognized need for greater sensitivity in determining hardness and to study the true conditions, the Vickers instrument was in-

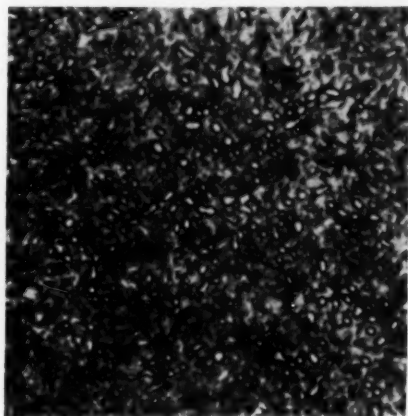


Fig. 6—Microstructure of oil hardening tool steel. This sample shows hardness value of Rockwell "C" 62. 1000X.

troduced in 1925 by Smith and Sanford. This instrument is similar to the Brinell in principle except that the indenter is a square based pyramid with 136 degrees between faces. The hardness number is determined from measuring the area of the indentation rather than the depth. At that time a new scale of hardness was established which is known as the Diamond Pyramid Scale.

Figure 4 shows a portion of this scale along with the comparative estimated value in Rockwell "C". This scale has actually been extended up-

wards much higher in order to evaluate the hardness of carbides and other extremely hard materials. A quick observation of this table will show that hardness values regarded as very high on the Rockwell scale are still relatively low on the DPH (Diamond Pyramid Hardness) scale. For example, Rockwell "C" 65 which is about the maxi-

5000 to 7000 DPH. As yet, no method has been offered to either prove or disprove this estimate, for diamond is employed as the indenter for testing all hard materials. Carbides, which are found in varying amounts and compositions in all steels, range in hardness from about 1000 DPH for Fe_3C up to about 2400 DPH for the complex vanadium carbide.

The reason why the hardness of such materials cannot be measured by the normal indentation test is due to the fact that they are so brittle that a heavy indenter actually fractures its way through rather than causes the material to flow as in the instance of somewhat softer materials. This together with the fact that oftentimes materials such as steels are composed of more than one constituent, render it necessary to devise other means of making hardness tests if any true characteristics are to be revealed. In the first place, an extremely light load must be applied upon the indenter so that no fracturing will take place and second, the indenter must be placed accurately upon known locations when constituents with varying hardness values are present.

These requirements have brought forth the newer technique known as microhardness testing. This term is inclined to be misleading. It actually refers to small indentations rather than the testing of small hardness values as the name might imply. A number of instruments have been offered which can be used for this delicate hardness testing though one of the most popular models is depicted in Figure 5. This instrument is commonly known as the "TUKON". Either the square based 136-degree diamond pyramid normally used in the Vickers machine or the

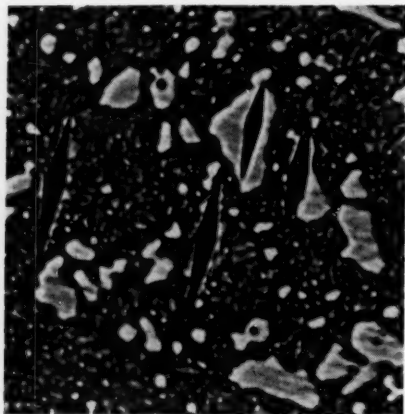


Fig. 7—Microstructure of high alloy tool steel in the hardened condition. This sample shows Rockwell "C" value of 62 on the matrix with Diamond Pyramid values in excess of 2000 on individual carbides. 1000X.

mum hardness of most hardened tool steels, is equal to only 820 on the DPH scale. The question then becomes: what materials possess such high hardness values and why are they not registered in the normal indentation test? The fact is that many materials as well as minor constituents of materials do possess hardness values far higher than any hardened steels. Carbides, nitrides and minerals are among these materials.

It has been estimated that diamond, which is the hardest known substance, possesses a hardness value of

newer rhomb-based diamond pyramid known as the Knoop indenter can be successfully used in conjunction with this type of hardness tester.

The load applied upon the indenter may be varied from a few grams (in some instances as low as 1 gram) to 3000 grams. A micrometer stage facilitates accurate locating of the test piece and rapid testing. Rapidity of testing and accuracy are further enhanced by the built-in Filar microscope. It is true, due to the care with which tests must be made, that they must be conducted with the same care that would normally be employed in a metallurgical laboratory. It must be remembered that this sort of testing is usually done with the idea of studying conditions rather than to employ the method as a means of inspecting tools or parts.

It was stated in a preceeding paragraph that steels were frequently composed of two or more constituents so that the normal hardness reading would not necessarily reveal the true conditions. It is not at all unusual, for example, to have two hardened die steels which show exactly the same value when measured by means of the Normal Rockwell tester, and yet one would outdo the other many folds in service. Such facts have naturally caused tool and die makers and users to become puzzled and feel that there was some deep and dark mystery surrounding steels used for such applications. In fact, until a relatively few years ago, before the reasons were understood, many metallurgists were also puzzled at the widely varying results. Microhardness testing has now withdrawn the shrouds of mystery surrounding this phenomenon.

Figure 6 shows, at 1000X, the micro-

structure of a 1.00 per cent carbon oil hardening tool steel. It is easily observed that this structure is reasonably homogeneous. The hardness of this sample showed a value of Rockwell "C" 62 which is regarded as quite high and suitable for most die applications involving cold work. Figure 7 shows the microstructure of a high al-



Fig. 8—Microstructure of heat treated cast iron. The matrix shows very high Diamond Pyramid values. The soft carbon inclusions tend to give erroneous readings when such materials are measured by conventional indentation methods. 350X.

loy die steel also used for cold working applications. It is likewise obvious that this structure is far from homogeneous. The white pools of varying size distributed throughout the hardened matrix are complex carbides which did not dissolve during the heat treatment. It will also be noted that there are several elongated diamond impressions in different locations. These impressions are from hardness tests made by means of the Knoop Indenter. It is obvious that those made on the darker matrix are appreciably larger than those made directly on in-

dividual carbides, thus showing that the hardness of the carbide is much higher.

Actually, the hardness of the matrix shows a diamond pyramid number of about 750 (just over Rockwell "C" 62) whereas the carbides show values up to diamond pyramid 2200 which is far beyond any estimate of

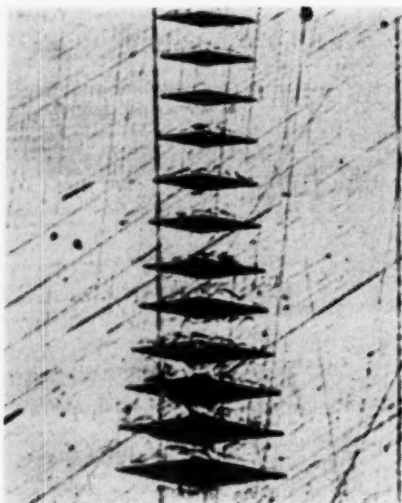


Fig. 9—Accurate hardness values are often determined on thin cases by means of the cross sectional hardness survey as shown here. The larger Knoop indentations indicate a lower hardness value. 150X.

Rockwell "C" value. Thus, the reason for the increased abrasion resistance of the latter steel is obvious, for the wear is really being taken by the hard carbide particles with the matrix acting primarily as a holder. A large indenter such as employed in the Normal Rockwell merely causes these particles to flow out of its path or fractures them so that their hardness value is not registered.

Since these carbide particles exist in

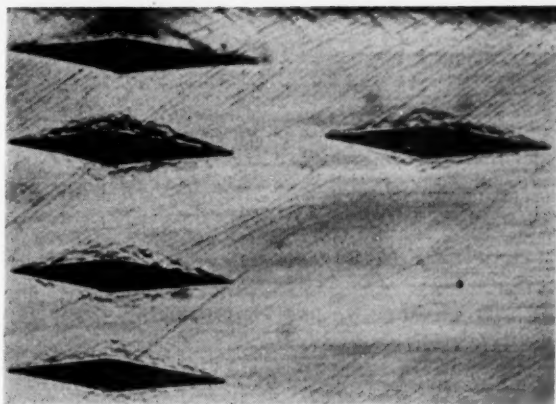
the annealed steel as well as the heat treated structure one might ask: why heat treat the steel if the wear is being borne by the carbide particles? The answer to this question is that carbide particles flow and become dislodged in soft steel so that a stiffer matrix is required to hold these particles in place. There is no doubt of the fact, however, that the hardness of the matrix is much less critical in the instance of steels possessing appreciable amounts of free carbide in their structures.

Many studies have been made to determine just how hard the matrix must be in order to lend sufficient support to the carbide particles. This has not been definitely established due to the many different applications, but in many instances the normal indentation hardness may be as low as Rockwell "C" 55 without sacrificing performance. It is, of course, extremely advantageous in many applications to keep the hardness low thus gaining in the tougher matrix.

Figure 8 illustrates another instance where the normal indentation hardness readings are completely misleading. To a great extent it represents a reverse of conditions described in the preceding paragraphs. The microstructure shown in Figure 8 is one of a heat treated cast iron. The hardness of this specimen measured by Rockwell "C" was found to be 54, while the diamond pyramid value of the matrix was found to be 789, which, from the conversion tabulation (Figure 4) is equal to about Rockwell "C" 64.

The reason for this wide discrepancy is from the fact that an appreciable volume of this material is free graphite (round black pools) which possesses essentially no hardness. Thus, an or-

Fig. 10—The cross sectional hardness survey may also be used to detect the causes for soft surfaces. The steel sample shown here is obviously decarburized near the surface. 350X.



dinary indenter tends to average no hardness along with a high value and give a result, which does not reveal true characteristics. This material is actually very high in resistance to abrasion; the graphite serves as a lubricant to enhance the properties of the hard matrix.

Figures 9 and 10 illustrate two additional examples of where normal indentations may be grossly misleading. Figure 9 shows a series of Knoop indentations (150X) taken on a cross section of a case hardened part. It will be observed how the marks become longer as the distance from the edge, shown near the top, becomes greater. In the normal method of hardness testing the indenter is applied at right angles to the surface so that in the instance of thin cases the indentation is so great that the material some distance from the surface is actually the portion being measured. Thus, a low reading is obtained which is in no way indicative of the true characteristics at the surface which is usually most important.

Figure 10 portrays another condition which is often responsible for erroneous hardness readings. In this instance, the edge of the steel specimen is also shown near the top of the photomicrograph (350X). It will be noted that the uppermost Knoop indentation

is longer than those below, thus showing a softer surface. This is caused from decarburization and here again a normal hardness reading taken at right angles to the surface tends to average the soft skin with the hard base and present readings which are grossly misleading. In this instance, it would merely be necessary to grind away a few thousandths inch in order to obtain a fully hard surface.

It is not the purpose of this treatise to confuse people relative to hardness testing or to infer that parts should be regularly inspected by such methods as microhardness testing. The intention is to publicize more widely this newer concept of hardness, now well known in laboratories, but poorly understood among many individuals who are responsible for using hardness testing equipment in the inspection of parts and materials. The use of the normal indentation hardness testing equipment should be restricted to comparison testing and even then the type of material must be given full consideration. Prescribed specifications and methods of testing should be based on results from more accurate tests.

Treatment of Edges of Fabricated Sheet Steel

By FRED ROGERS

In which the author outlines twenty methods for finishing off rough edges of various thicknesses of sheet metal.

THE sheared edges of sheet metal fashioned and fabricated into protective guards, splash deflectors, cabinets, and hinged or removable covers are a menace to the shop man or machine operator. Untrimmed edges are conducive to cuts and scratches which, if not properly attended to, may lead to serious consequences. The remedy for overcoming this deficiency is to have these edges smoothed off or so formed that cuts and scratches are prevented even from careless handling. This article outlines twenty ways to finish off rough edges of various thicknesses of sheet metal, shown in short sections of length.

Sheet steel of approximately 1/32, 1/16, 5/64, 3/32, and 1/8-inch thickness is commonly used in the machine tool

and associated industries for the

above mentioned details. If the thickness is sufficient, such as 1/8 inch, the sheared edge may be rounded off by draw-filing or hand grinding, as illustrated in Fig. 1.

This would mean a radius of 1/16 inch, upon which edge a man could rest his arms without serious mishap. Metal of 3/32-inch thickness would be the minimum so treated. Figure 2 represents metal 1/16 inch thick. A strip of the same thickness by 3/16 to 1/4 inch wide is spot welded along the edge and finished off in the same manner as in Fig. 1. This leaves a seam, however, along the entire edge which might be objectionable.

If the metal is ductile with a grade of "dead soft," for instance, it may be bent back on itself, as illustrated in Fig. 3. This is difficult to do if there is

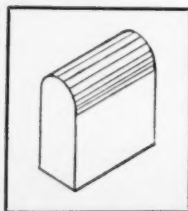


Fig. 1 — The sheared edge may be rounded off by draw-filing or hand grinding.

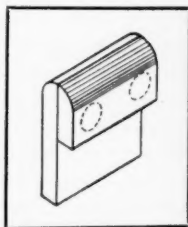


Fig. 2—A strip of the same thickness as the metal sheet is spot welded along the edge and finished off in the same manner as in Fig. 1.

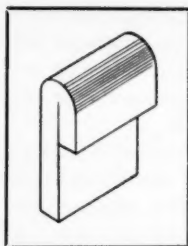


Fig. 3—If the metal is ductile, it may be bent back on itself.

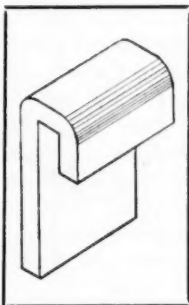
The metal thickness is $\frac{1}{16}$ inch; in fact, the same thickness is portrayed through Figs. 2 to 7 inclusive.

While the bend in Fig. 3 is 180 de-

spring-back in the material as the joint may not be closed. This may not matter in some cases but where it does, spot welding must be resorted to in order to keep the flanged portion in place.



Fig. 4—This double bend, formed in a brake, has sharp inside corners with space between inside faces equal to approximately the thickness of sheet.



grees, the two bends in Fig. 4 are 90 degrees each. This double bend is formed in a brake. The inside corners are sharp, and the space between the inside faces is approximately the thickness of the sheet. However, such a close bend

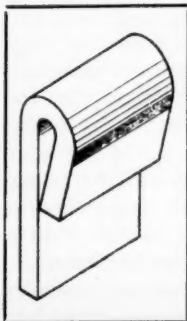


Fig. 5—This band is similar to that in Fig. 4 except that a half-round instead of a square tool was used.



Fig. 6—A deep flange is bent with a half-round opening equal to two thicknesses of metal.



is hard on the brake tool as it is too thin to stand up for long.

The bend in Fig. 5 is similar to that in Fig. 4, in that the original space between the flange and sheet is of one thickness of the metal except that a half-round tool was used instead of a square tool. The flange is deep; that is, about three times the sheet thickness. This flange is bent back until it touches the sheet while retaining the original opening at the top of the loop. The outside is $1\frac{1}{2}$ times the thickness, while in Fig. 4, the outer radius is one thickness of metal with a flat equal to one thickness.

In Fig. 6 a deep flange is bent with a half-round opening equal to two thicknesses of metal. The depth of flange is three times the sheet thickness. An easier bend is shown in Fig. 7. This is a half roll or 180 degrees and has a ratio of 3 to 1, inside radius to metal thickness. On the outside it is, of course, a 5 to 1 ratio which makes a very satisfactory edging.

When used as the flanging for a

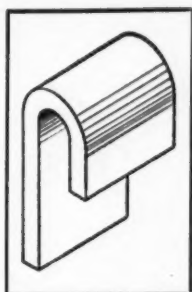


Fig. 7—This half roll has a ratio of 3 to 1, inside radius to metal thickness.

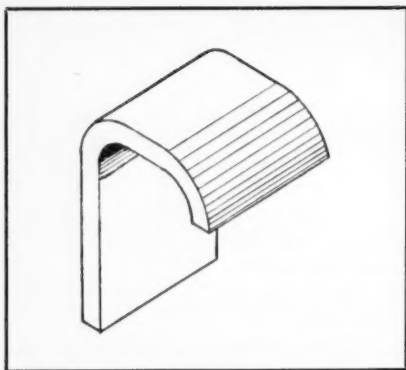


Fig. 8—The inside bends of this flange are 3 to 1 ratio but the radii are about two thicknesses apart, thereby producing a flat at the top of the roll.

splash guard where the splash and spattering of oil or coolant are pronounced, a wider flange may be required, as depicted in Fig. 8. The inside bends are 3 to 1 ratio but the radii are about two thicknesses apart, thereby producing a flat at the top of the roll. In Fig. 9, the same width of flanging is shown as in Fig. 8, but the flanging is made half round as in Fig.

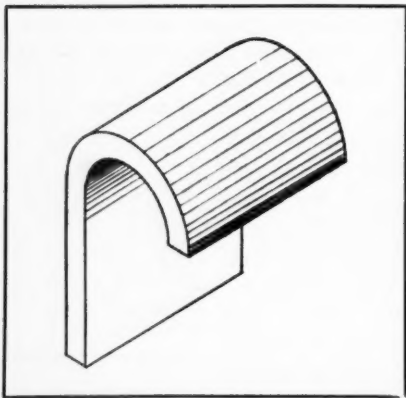


Fig. 9—This flange has the same width as that in Fig. 8 but is made half round.

5. There is little difference between Figs. 8 and 9 except the shape of the brake tool, the width of flanging being identical but a little deeper in the case of Fig. 9.

In Figs. 2 through 9, the sheared and roughened edges in these sketches are left untrimmed. The square corners left by the shearing tool are untouched so that if such a guard were picked up by the flange, whereby the

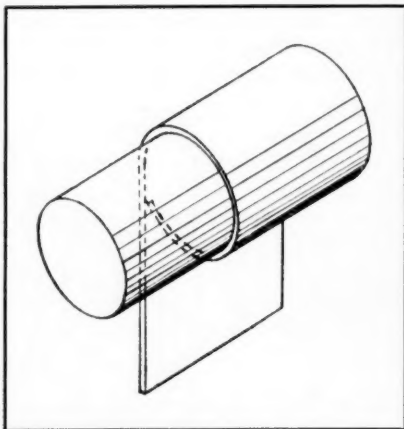


Fig. 10—To strengthen the top edge, the sheet metal is curled into a full roll. A stiffener of wire is used as a core over which to curl the sheet.

fingers curl over the smooth bend and under the edges of the sheet, the fingers would still encounter razor-like edges, tears, and splinters. In the foregoing methods, with the exceptions of Figs. 1 and 2, the top edge only has been made smooth. If a flange is required where the rough sheared edges are completely hidden, then a full rolled edge must be fabricated.

If one goes to a seed or hardware store in the spring, square tubs 12 to

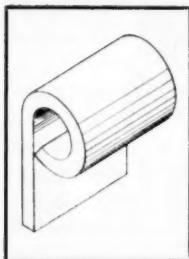


Fig. 11—For machine parts, the wire may be dispensed with and a nearly 360-degree roll made without further stiffening media.

14 inches across filled with seeds are in evidence. Such tubs are made of light sheet metal considerably thinner than $\frac{1}{32}$ inch. To strengthen the top edge, the sheet metal is curled into a full roll, as shown in Fig. 10. One need only pick up a metal waste basket in the

home to see this construction. A stiffener of wire is used as a core over which to curl the sheet. Usually in machinery of all types and allied mechanisms, thin gauge metal, such as in a tub or waste basket, is not used for a protective covering as it is too light in weight. When a full roll is required for machine parts, the wire may be dispensed with and a nearly 360-de-

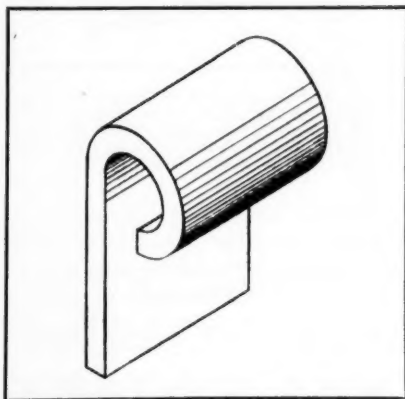


Fig. 12—In this bend, the edge is stopped on the vertical center line of the radius or 270 degrees of roll.

gree roll made without further stiffening media. Such a roll, as in Fig. 11, is much stiffer than those shown previously. A guard made with this type of edging can be handled without fear of encountering rough sheared edges. There are some modifications of the nearly 360-degree roll which are claimed to be less expensive to fabricate. In Fig. 12, the edge is stopped on the vertical center line of the radius or 270 degrees of roll. The proportions of Figs. 11 and 12 are the same.

In the illustration of Fig. 13, the ratio of the opening to the thickness is as 2 is to 1. The roll is 270 degrees with the edge nearly touching the sheet perpendicularly. This means there is a small flat beyond the 270 degree bend. The bend in Fig. 14 is practically the same as in Fig. 13 except the metal is thicker. The ratio of this thickness to the hole is as 1 is to $1\frac{1}{2}$. The flat beyond the 270-degree mark is shorter than the previous illustration.

Solid bar or wire stock of $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, or $\frac{5}{16}$ inch

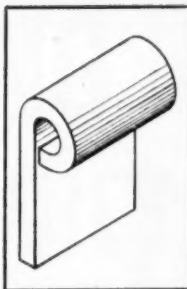


Fig. 13—This roll is 270 degrees with the edge nearly touching the sheet perpendicularly.

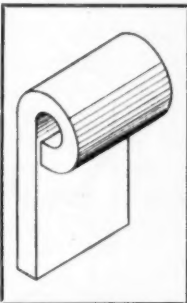


Fig. 14—This bend is practically the same as in Fig. 13 except the metal is thicker and the flat beyond the 270-degree mark is shorter.

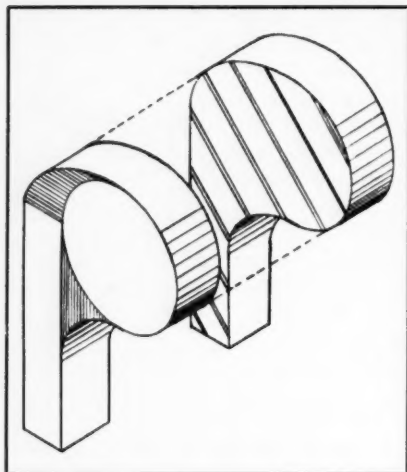


Fig. 15—The sheet is placed tangent to the solid rod and welded solidly top and bottom. After dressing off the weld, an oval-shaped beading results, as shown in the sectioned view at the rear.

in diameter can also be used as another form of beading for the sheared edges. In Fig. 15, the sheet is placed tangent to the rod and welded

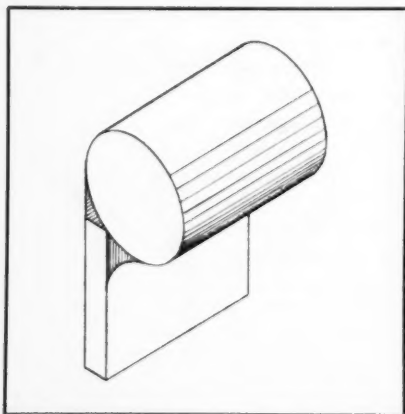


Fig. 16—In this fabrication, the outside of the sheet is tangent to the rod. The resulting open wedge is filled in with welding material and the lower side is also welded.

solidly top and bottom. The sheet terminates at the horizontal center line of the wire edging. The void is filled with welding material and thereafter ground smooth and buffed. The lower side of the rod is also welded but this is not particularly necessary. After dressing off the weld, an oval-shaped beading results, as shown in the sectioned view at the rear. The sheet steel, as shown, is of $\frac{1}{8}$ -inch thickness with $\frac{3}{8}$ -inch diameter rod.

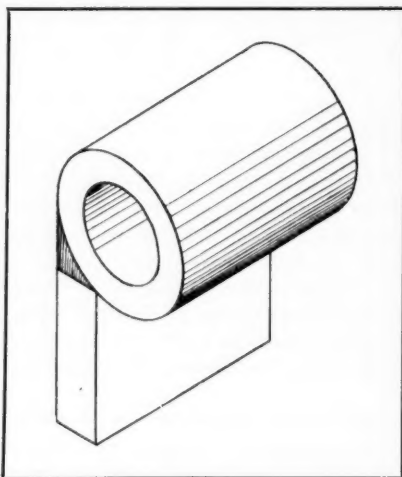


Fig. 17—A piece of pipe is welded to the sheet with the outer face of the sheet tangent to the outside diameter of the pipe. When the weld is dressed, the pipe is buffed at the same time to remove scale.

A lighter construction is shown in Fig. 16 where the sheet metal is $\frac{1}{16}$ inch thick and the rod $\frac{1}{8}$ inch in diameter. In this fabrication, the outside of the sheet is tangent to the rod, whereas in the previous illustration, the inside of the sheet was tangent to the rod. The resulting open wedge is filled in with welding material and the lower side is also welded. This makes

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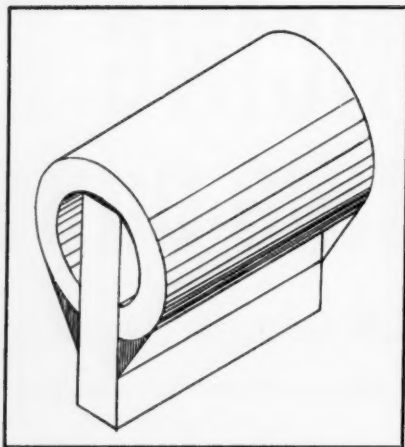


Fig. 18—The tubing is sawed open, the steel sheet inserted, and welded as shown.

a very satisfactory edge, as does the method in Fig. 15. Both constructions are somewhat heavier than those in Figs. 11, 12, 13, and 14.

A substitution for Fig. 15 is dis-

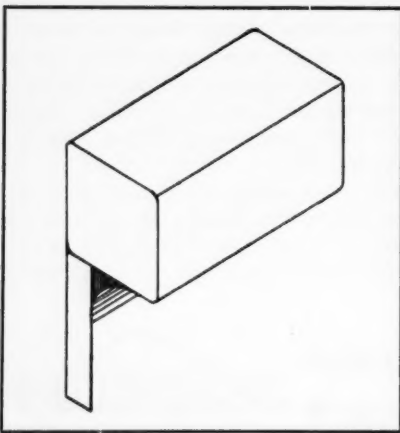


Fig. 19—Square cold drawn steel can be used for beading.

played in Fig. 17. A piece of black pipe of the seam welded variety is employed. A pipe size of $\frac{1}{8}$ inch is used, which is 0.405-inch actual diameter. The sheet is $\frac{1}{8}$ inch thick. It is welded in the same manner as in Fig. 16, with the outer face of the sheet tangent to the outside diameter of the pipe. The inside weld is not used as in Fig. 16. When the weld is dressed, the pipe can be buffed at the same time, thereby removing the scale from the pipe surface and leaving a smooth continuous

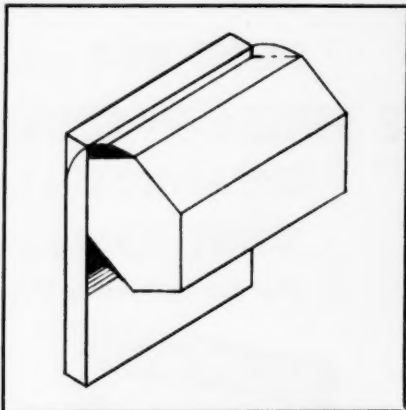


Fig. 20—For want of round stock, hexagonal steel was used in this instance.

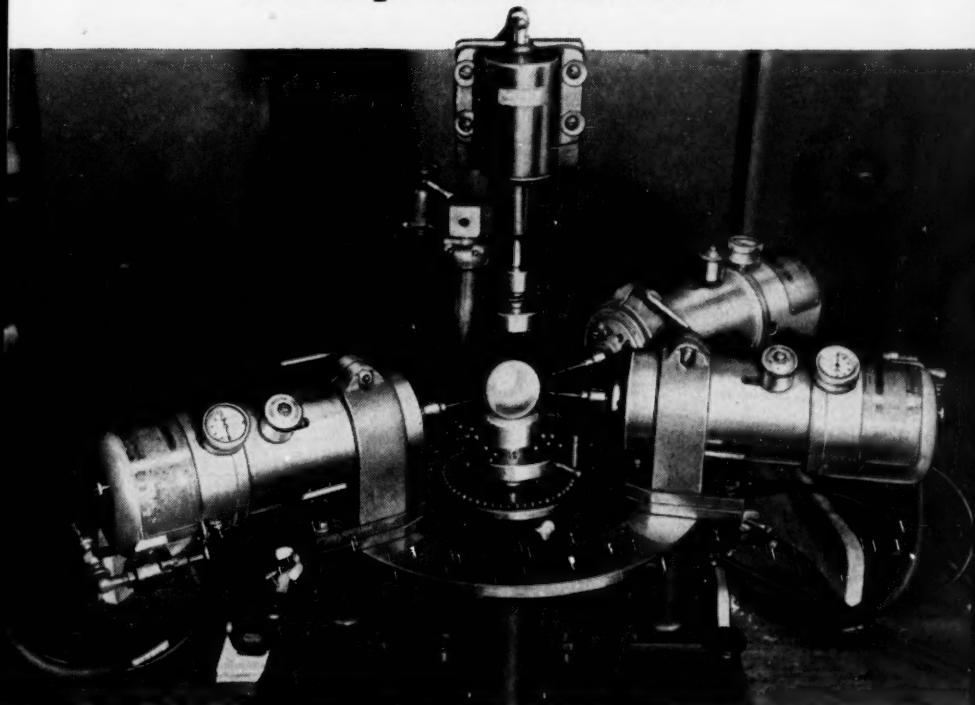
surface. Seamless steel tubing with a clean unscaly outside diameter may be substituted for the pipe and will require less buffing after dressing the weld or none at all.

In Fig. 18, the tubing for seam-welded pipe is sawed open and the sheet steel inserted. The inside of the pipe rests upon the sheared edge of the sheet and the two lower sides are welded as illustrated. While the sawing operation adds to the cost, it will be observed that the edging is symme-

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trical and not overhanging as in Figs. 10 through 17. However, the constructions shown in Figs. 11 through 17 are flush on the outside—a feature which some designers claim enhances the appearance where it counts.

Shapes other than round have been used for beading, as illustrated in Figs. 19, 20, and 20A. Square cold drawn

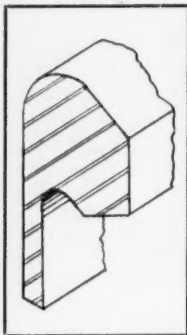


Fig. 20A—The method shown in Fig. 20 provided a satisfactory beading since a generous radius resulted, as shown in this cross-sectional view.

steel is used in Fig. 19, welded at the inside joint only. Here also, as in Fig. 2, a seam is visible from the outside. The square edge at the top is not considered as appropriate as when round stock is used.

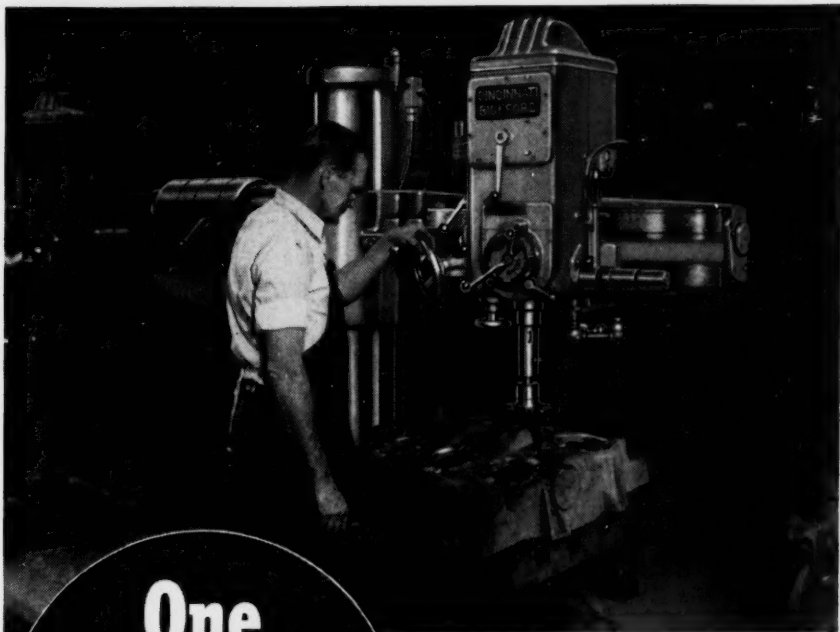
For want of round stock, hexagonal steel was used in Fig. 20. The sheet was placed against the side of the hex rod with its edge protruding about halfway between the edges formed by the across-flats and the across-corners terminations. The upper flat of the hex adjacent to the sheet was filled with welding material, as shown, and the corner of the sheet at the left was dressed off as shown. The lower side was also welded. Contrary to expectations, this proved to be quite a satisfactory beading since a generous radius resulted, as seen from the outside of the sectioned view in Fig. 20A.

Other forms of wire or bar shapes other than those shown can be used if available but probably are not as satisfactory as those outlined.

In addition to the end uses mentioned at the beginning of this article, the various shapes of bends, rolls, flanging, and bending are applicable to metal benches, doors, and drawers; belt and gear guards; machine bed drip pans; bins and hoppers; tool and tote boxes; chutes and conveyors; cabinets; metal furniture; tanks; and shelving.

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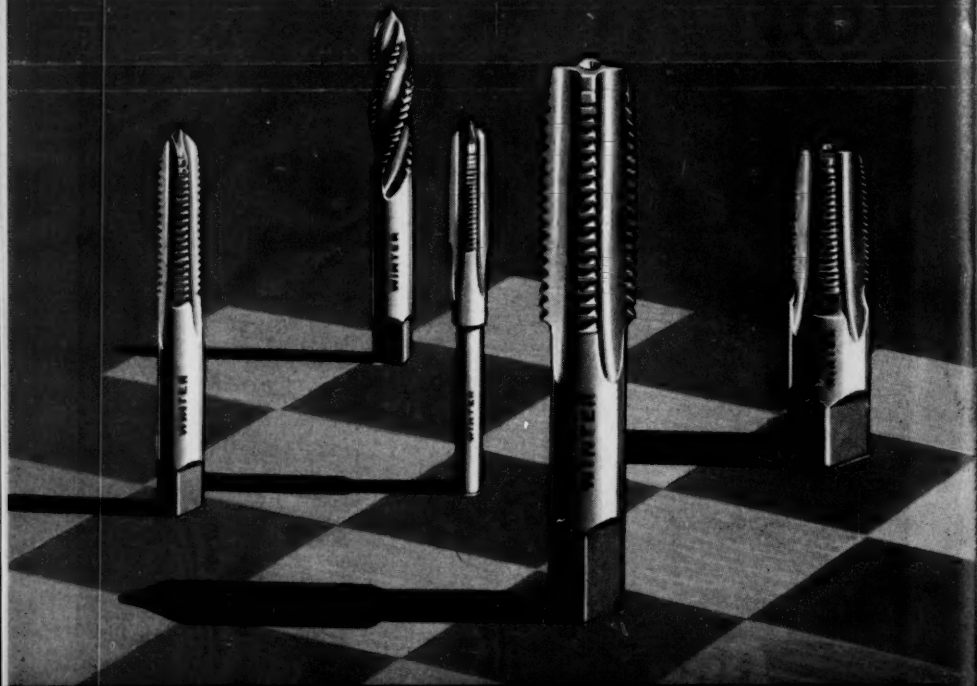
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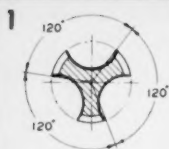
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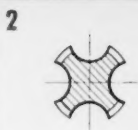
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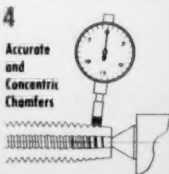
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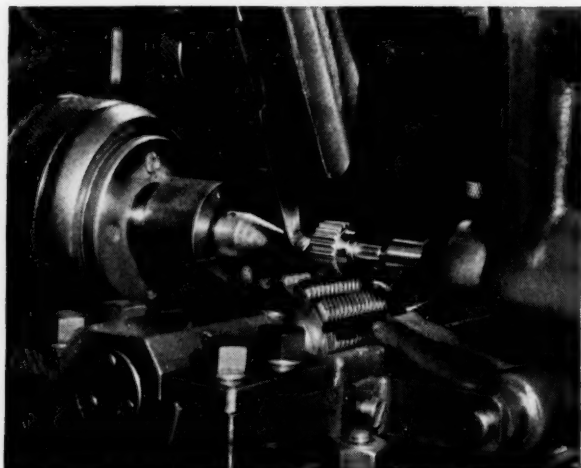


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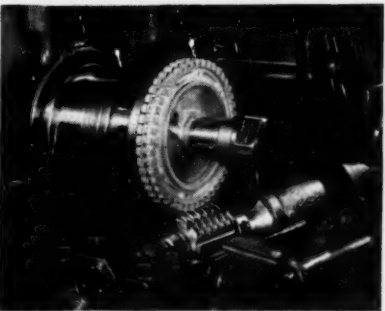
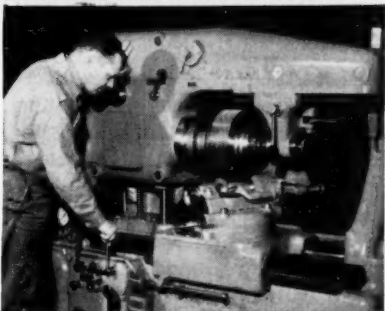
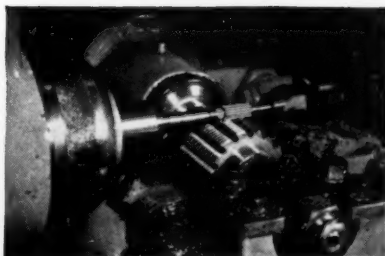
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Solving Stainless Steel Fabricating Problems, Part II

By LESTER F. SPENCER*

Concluding article covering a discussion of bending and drawing operations.

OPERATIONAL procedures involving straight flanging, bending, curling, bulging, necking, beading, and so on, belong to that classification of operations involving a bending action. The equipment employed for this type operation will vary considerably depending upon the variables present with a specific job within this category. Thus, architectural and automotive trim, which is produced both as long, straight sections and in high production quantities, is invariably produced on either roll forming equipment or on draw benches.

In the event that production is limited as compared to the condition as stated above, straight bending and flanging operations may be produced by means of the power brake, the single action press or a rubber forming technique, the latter method being exemplified by both the Guerin and the Marform processes. Where either curved sections or tubing are formed, there are a number of methods available which would include: (a) hand or three point bending technique employing either manual or mechanical

means in supplying the required power; (b) roll bending where the necessary curvature is obtained by the use of power rolls; (c) wiper type bending; and (d) wrapping or wrap form bending.

Although detailed discussion of the above mentioned methods for forming will not be given, it can be stated that, as is the case with other materials, the degree of bending of the stainless steels will be dependent entirely on the hardness or initial temper of the stock. Success in bending often hinges on the bend radii selected. In the bending of the straight chromium stainless compositions, particularly type 430, the radii employed should be as liberal as possible, since this material has a tendency to crack more easily when bending is performed parallel to the direction of rolling. Where severe bends are to be made, it is advisable to have the bending action either at right angles or at an angle of 45 degrees to the rolling direction.

On material that is 0.050 inch and under, a 90-degree bend on annealed material can be made with a radii less than the metal thickness. Objection-

* Chief Metallurgist, Landers Frary & Clark.

Table III

Type	Temper*	Thickness, T Range—Inches	Bend Radius R/T	Bend Diameter 2R/T	Angle of Bend Degrees
301	A—Annealed	All	1/2	1	180
302	B—1/4 Hard	0.050 & under	1/2	1	180
304		0.051 & over	1	2	90
316	C—1/2 Hard	0.050 & under	1	2	180
321		0.051 & over	1	2	90
347	D—3/4 Hard	0.030 & under	1 1/2	3	180
		0.031 & over	1 1/4	2 1/2	90
301	E—Full Hard	0.030 & under	2	4	180
302		0.031 & over	1 1/2	3	90
304	B—1/4 Hard	0.050 & under	1	2	180
		0.051 & over	1	2	90
316	C—1/2 Hard	0.030 & under	2	4	180
		0.031 to 0.050	3	6	90
		0.051 & over	2	4	90

* Definition of Temper			
Temper	Tensile Strength, psi		Yield Strength, psi 0.2% (min.) offset
	Minimum	Maximum	
A	75,000	110,000	30,000
B	125,000	75,000
C	150,000	110,000
D	175,000	135,000
E	185,000	140,000

Bending Properties of Stainless Steels According to Army-Navy Aeronautical Specifications, AN-QQ-S-772a and AN-QQ-S-757 for Corrosion Resistant Steel Plate, Sheet and Strip.

able surface disturbances if encountered can usually be overcome by increasing the bend radii upward to twice the metal thickness. The use of a radii which is twice the metal thickness is imperative in producing a 90-degree bend on stock thicknesses above 0.050 inch. In bending at an angle of 180 degrees, type 430 can usually be bent upon itself when the material thickness is usually less than 0.050 inch. This is true only when the bend is transverse to the direction of rolling. When this type bend is made parallel to the direction of rolling, the inside bend radii should be approxi-

mately twice the metal thickness. In the bending of material that is 0.050 inch in thickness or heavier, the bend radii to produce a 180-degree bend angle should be from 2 to 4 times the metal thickness, the former radii mentioned being used when the bend is transverse to the direction of rolling, whereas, the latter bend radii is employed when the direction of bend is parallel to the direction of rolling.

In bending the austenitic stainless steels, both the work hardening characteristics of this material and spring-back should be considered. The former condition can be controlled by the use

of the proper radii in relation to both the hardness or temper of the stock and the thickness. This is adequately illustrated in Table III which can be used as a guide in determining bend radii. The latter factor mentioned can be controlled to some extent by proper tool design with experience and experimentation being invaluable in determining the extent of this factor. However, once determined in any specific instance, it can be easily incorporated within the tool design.

In many instances, highly finished stock is obtained for use in forming a shape by a bending procedure, the reason for the choice being usually due to the difficulties encountered in polishing the completed shape. As mentioned previously, the use of highly finished stock will be of no avail if proper precautions in protecting this finish are not taken during forming. Thus, common practice, in this instance, would consist of cleaning the section thoroughly to remove any semi-hard foreign particles and then pasting a high quality kraft paper onto the section to obtain the necessary protection. After forming has been completed, the protective paper can usually be easily removed by soaking the section in hot water.

Press Drawing

One of the more frequently used operations at LF&C is the press drawing of the stainless steels. The greater portion of our experiences has been in the drawing of the austenitic stainless steels as exemplified by types 301, 302 and 305. Needless to state, that when the curtailment of nickel on consumer goods came into effect, considerable difficulty was at first experienced with the substitute stainless, type 430.

The drawing operation consists of stressing the material under a tensile loading which is beyond its elastic limit, but still within its ultimate strength. The ductility of the material is the first consideration. This factor, as stated previously, is of considerable magnitude within the austenitic group. However, this is predicted upon the usage of sheet that has a uniform anneal to maximum softness for the specific grade in combination with a uniform grain size. In the event that a sequence of drawing operations are involved which have interspaced anneals, it is imperative that control conditions in annealing be observed so that a factor such as grain size does not interfere with the drawing qualities or appearance of subsequent drawing operations. Thus, it has been our experience, indeed costly, where occasionally a coarse grain size has occurred during annealing with the result that in a subsequent drawing operation, a coarsening of the surface occurred. This increased our polishing costs so as to remove this objectionable condition. In addition, improper annealing or preparation for annealing can seriously affect the corrosion resistance of a drawn container made from austenitic stainless, however, this particular phase will be discussed more completely.

Both types 302 and 304 stainless draw equally well; the superior reductions obtained on type 305 have already been mentioned. Type 301 stainless will wrinkle to a greater extent than the previously mentioned alloys and it has been our practice to limit the percentage draw on this specific analysis when used. In addition, stress cracking of type 301 shells are more prone to occur. Both types 321 and 347

stainless, the 'stabilized grades', have less favorable forming characteristics than the other austenitic alloys such as types 302, 304 and 305. However, this fact must often be accepted where these specific alloys are required for welding procedures subsequently placed on the unit part. In these alloy types, one may be able to increase formability by specifying a higher nickel content within the alloy up to approximately 12.0 per cent, the increased drawability having been found to be considerable as compared to standard analysis. This increase in drawability was proportional to the nickel content within the alloy. A banding effect may also be encountered in these alloy types which detracts from the appearance of the shell and also reflects on the drawability.

As mentioned previously, the use of 430 stainless as a substitute for the standard type 302 austenitic steel was a bit of a problem. However, it had been ascertained that on shallow drawing both the press speeds and die clearances that had been employed in the working of mild steel were satisfactory. Deep drawn shells required slower press speeds. A safe starting point for this factor is approximately 35 to 40 feet per minute. In the layout of a sequence of operations in which type 302 stainless was employed, the operational steps and the interspace anneals increased. This, in some instances, indicated additional tooling cost and the combination of the two factors mentioned increased operational cost which was not compensated adequately by the decrease cost of type 430 over type 302 stainless. Thus, an operational sequence, such as is indicated in Fig. 4, has proven satisfactory in drawing type 302. In the initial

cupping operation, an approximate 48 per cent reduction had been realized which was followed by an anneal. The first re-draw realized a reduction of approximately 17 per cent after which the shell was pierced and trimmed. In producing an identical shell from type 430 stainless, the operational sequence would include three draws and two

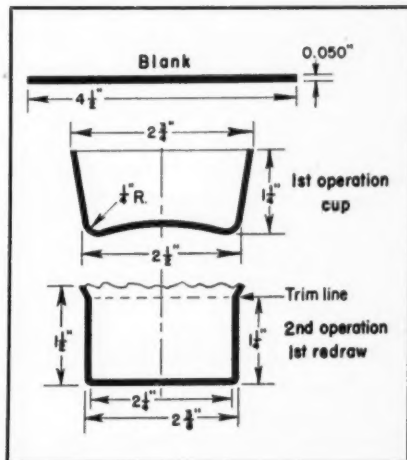


Fig. 4—The sketches shown here serve to illustrate one operational sequence which has proved satisfactory in drawing type 302 stainless steel.

anneals. Thus, the cup would have an approximate reduction of 28 per cent which is followed by an anneal; the first re-draw would have an approximate 20 per cent reduction which is followed by the second anneal; and, the third re-draw will complete the shell which is followed by both piercing of the bottom and trimming.

It can be stated that type 430 has the ability to be drawn into deep shapes; however, one must realize that the drawability, which is indicated to some extent by the previously men-

tioned Olsen cup test, is limited. If the proper precautions in calculation of draw sequences and the selection of properly inter-spaced anneals be made, little difficulty will be experienced.

Single action, double action mechanical and hydraulic press types are employed in the drawing of the stainless steels. The former type, the single action press, is employed to a limited extent with the hold down action being obtained through the medium of pneumatic, hydraulic or spring cushions. Both the double action mechanical and the hydraulic press type may be employed for deep drawing procedures, the latter type being preferred due to the slower rate of travel that can be realized. As in the other type operations discussed, additional power is required to draw the stainless steels not only due to the higher tensile of the 'annealed' austenitic steels, but also due to the work hardening characteristics of the material.

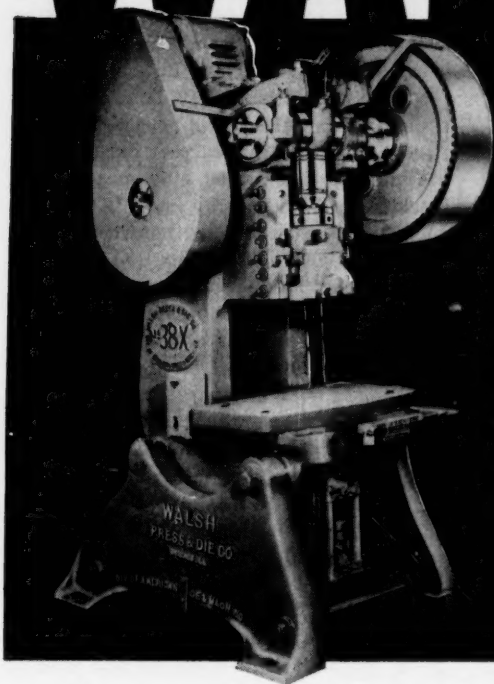
The radius on both the punch and the draw ring is of considerable importance in the drawing of steels in the austenitic group. In the former instance, if the punch radius is too small, rupture will occur; whereas if this radius is too large, puckering may occur. Conversely, if the die ring radius is too small, excessive work hardening will result and may cause premature failure; whereas if this radius is too large, excessive wrinkling will occur. The punch radius which is usually used is approximately four times the thickness of the stock to be drawn, while the radius of the die ring is usually stated to be from four to eight times the thickness of stock to be drawn. Any specific job may vary from the values given since a number of other variables may affect these

values. Any trimming allowance is usually left on the top of the drawn shell either as a flange or as a continuation of the straight side wall. In the former instance, an ejector pad may emboss the bottom of the shell formed or may even perform a shallow reverse draw.

This particular operation is illustrated in Fig. 5 which is a four-draw sequence. The first operation, known as the 'cup', realized a reduction of approximately 35 per cent which was followed immediately with the first redraw which had a further reduction of approximately 12 per cent. At this stage, the first full annealing treatment was inserted to restore the ductility of the shell and permit further drawing. In the second redraw, a two step punch was employed. The reductions were approximately 25 per cent on the top portion of the shell and about 30 per cent on the bottom portion of the shell. It is in this operation that a slight reverse contour had been placed on the bottom using a mating die with a contour bottom pad. The second anneal then followed and the third redraw completed forming the shell to the required dimensions.

Other conditions that should be observed in the press drawing of the austenitic stainless is edge condition, clearance and press speed. The presence of burrs on the edge of blanks can prove quite troublesome and may lead to stress cracking. This condition often may be entirely eliminated by some means of deburring. It may be more advisable to study the conditions under which this burr was produced. A press speed from 30 to 50 f.p.m. is usually recommended. Our practice is to use the lower press speeds for the more difficult drawing operations

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which can be obtained by the use of hydraulic equipment. In regard to clearances, the value usually employed is approximately twice that employed in the drawing of mild steel of identical gage thickness. This factor

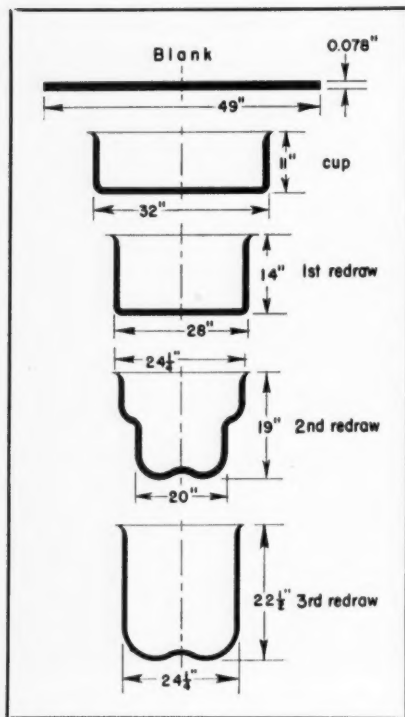


Fig. 5—Illustration showing a four-draw sequence on annealed type 302 stainless steel.

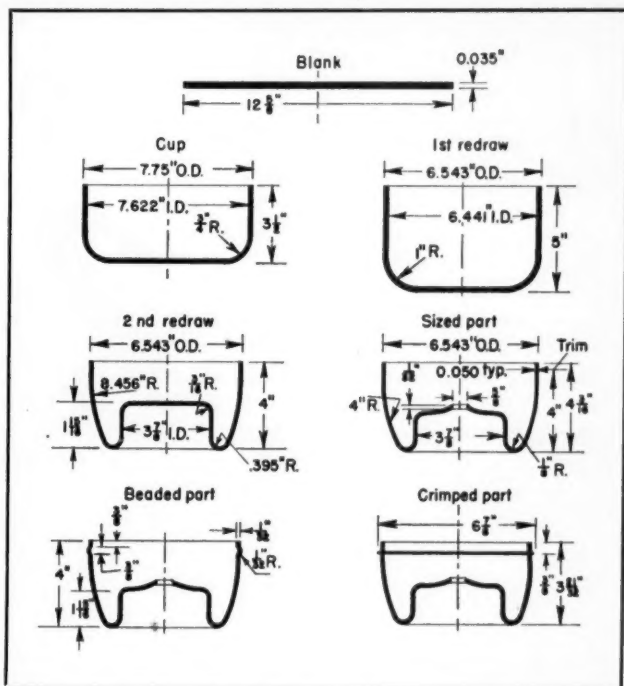
may vary under conditions where ironing of the shell is required. As previously mentioned, the preferable finish of the austenitic stainless sheet is a dull pickled finish for retention of lubricant.

Reverse contour drawing has been practiced by LF&C in both the type

302 austenitic and the 430 ferritic stainless compositions; however, an operation such as this will require considerable experimentation before success on a production basis is realized. A good example of a reversed draw on a type 302 stainless composition is illustrated in Fig. 6. This cup is being made by International Harvester Company. All of the operations illustrated are performed on a double action press. The die and hold down are made from aluminum bronze, whereas the punch is made from cast iron to which a carburized steel nose is attached. Both the cup and the first redraw were performed before a regenerative anneal was required with the combined reduction being approximately 52 per cent. After pickling, the third drawpiece is obtained. The hole is pierced, the part sized and the hole flanged with all operations being performed on a single action press utilizing a gang die equipped with three stations. The shell is then trimmed on a lathe and then deburred after which a form bead is made with contouring rollers. The finish form follows, utilizing a 140-ton single action press.

The difficulties of drawing increase as the shape of the shell deviates from a circular draw-piece to one that is either rectangular or square, this being especially true as the depth of draw increases. This can be exemplified in the fact that in the development of a six draw, four anneal sequence to produce a deep drawn rectangular shell, the man hours expended for experimentation and development of the shape was over five times that which would normally be given in developing a circular deep drawn shell. This difficulty in drawing is usually due to an unequal distribution of stress dur-

Fig. 6 — Illustration showing a good example of a reversed drawing operation on type 302 stainless steel.



ing drawing which leads either to breakage at the corners or to excessive wrinkling. Thus, in an oval shape, the end sections of the blank have greater compressive movement than do the sides of the drawn container. Likewise, in a drawn rectangular shape, the corners will have excess metal as compared to the sides of the shape.

Usually, in the drawing of rectangular shaped shells, the limiting depth of draw is approximately four to six times the radius at the corner. On subsequent reductions, the full radius employed at the corners can be safely reduced. This reduction occurs throughout the sequence of draws so that in the final re-draw, the radius as specified in the blueprint can be obtained. However, there is a consistent relationship between the radius on the drawn shell and the one proposed on the re-draw so as to obtain both blank corner holding strength and for the prevention of wrinkles.

In some instances, it is necessary to use tabs at the corners to obtain the

necessary gripping action by the blank holder. These tabs will aid in the control of metal flow in these areas. The use of corrugations may also aid in gripping the tabs. As has been indicated, the radii of the tools will vary from side to corners. The value of the radii will be dependent upon such factors as metal thickness, shape of draw component, and so on. An approximation from which to start would be a radius of five times the metal thickness and increasing toward the corner areas so as to provide additional relief in these areas. Due to the increase of metal thickness at these corner areas, it has been suggested that the die radius be equal or even smaller than the punch radius to provide additional clear-



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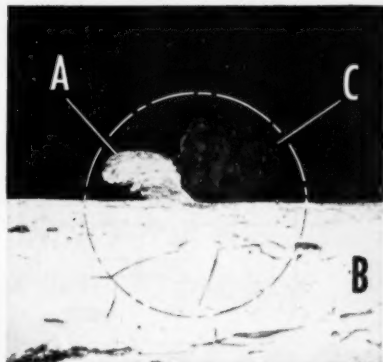
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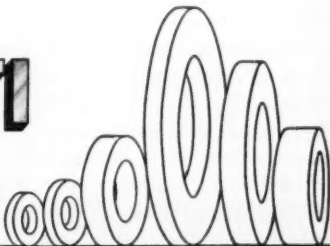


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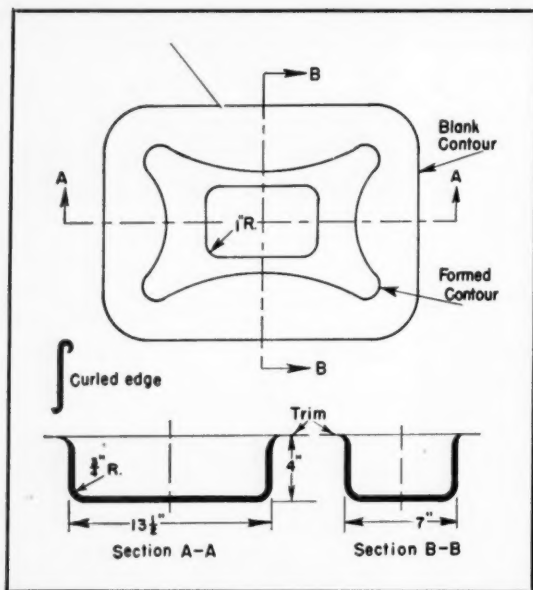


Fig. 7 — Example of a single-draw rectangular shell. Material is type 302 stainless steel 0.035 inch thick.

on the finished bulged part which may prove objectionable if the formed piece is to be highly polished. Our experience with rubber bulging dies reveals that this method, although eliminating the objectional flats previously mentioned, has relatively low service life. Usually 3,000 or 4,000 pieces can be obtained before it is necessary to replace the punch. The use of a hydraulic fluid, such as oil, water, soluble oil, and so

on. In regard to clearances between the punch and the die components, a value 10 per cent greater than the thickness of the metal to be drawn has been suggested. The single draw rectangular shell, as illustrated in Fig. 7, provides ample radii with the ratio of the inside radius of the shell to the drawn depth being approximately 1 to 5.3. This single draw was followed by a full anneal after which it had been pickled to remove the scale, sized, trimmed and beaded as indicated.

Although a bulging operation involves compressive stresses similar to that obtained in bending, this type operation is often associated with deep drawing. The two most utilized mechanical methods of bulging involve either the use of a spring-held segmented die or a rubber punch. A difficulty associated with the segmented punch is that slight flats may appear

on, has been used to some extent; however, the difficulty in leakage of the fluid must be overcome.

The use of a spinning method, in such operations as beading, curling, necking and bulging, is used quite extensively as an auxiliary operation following a deep drawing sequence. As in press working operations, greater pressures are required to realize deformation which precludes the use of rigid equipment. In addition, care must be taken to leave the edge of the spun article untouched until the greater portion of the spinning operation has been completed. Failure to observe this precaution will lead to splitting from the outer edge inwardly.

Stainless austenitic steels are very prone to stress crack. Thus, in the event that large reductions are made prior to an anneal, the drawn shell may crack during the interval in

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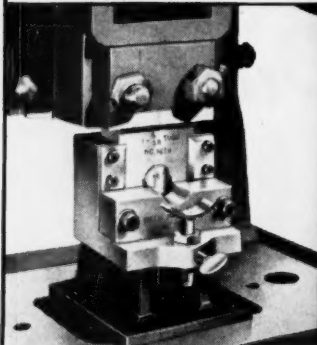
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awaiting the next operation. Usually, if the drawn shell does not crack after the first hour, it can be assumed that the reductions are satisfactory. If breakage does occur, the reductions made are too large and an anneal must be placed either directly after that redraw before the anneal, or re-calculate reductions so that less reduction has been realized prior to the first anneal. The latter method is the safest course to follow. Thus, if the first procedure given is followed, the time interval between the last redraw and the anneal may be too long with the result that the shells will crack upon standing. The first procedure would dictate rapid movement of shells from the press through the cleaning operation then to the anneal in less than one hour. Thus, these "stress cracking" phenomena must be considered in the layout of operational procedure. Experimental runs prior to actual production will usually indicate the spots where an anneal should be included.

Upon occasion, stress cracking phenomena may occur after the unit part is in service. However, as far as we can determine from our personal experience, this cracking is associated with both a stress and a corrosion factor. This is a bit different than the previously mentioned "stress cracking" which is also often denoted as "stress corrosion cracking". Fortunately, this does not occur too frequently. The only remedy for this phenomenon, where the ultimate use may indicate the possibility of this type cracking, or, where actual cracking does occur in service, is to have a full anneal on the completed shell or draw-piece prior to its introduction to the assembly line. This constitutes the elimination of one of the factors as-

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sociated in "stress corrosion cracking". The term "fire cracking", which fortunately is also of infrequent occurrence, is associated with the rapid relief of stress under the influence of heat such as annealing. This has occurred within our experience in which an austenitic stainless type 302, which had been highly stressed, entered the annealing furnace and had a multitude of vertical cracks from the edge downward after exit from the furnace. This condition was remedied by including a pre-heat prior to its introduction into the full heat of the annealing furnace.

One of the more important factors, which should be recognized by the press operator, is that of thoroughly cleaning drawn or spun shapes made from the austenitic alloys prior to an anneal. This factor is of such import-

ance at LF&C that the shells are examined under black light prior to annealing to determine its cleanliness. Thus, dirty shells, which will have a spotty fluorescent glow under black light, are rejected and sent back for a second cleaning operation; whereas, clean shells, which have a uniform deep violet color under black light, are permitted to be annealed. This procedure is especially invaluable where deep drawn containers are being examined. The reason why so much attention is given to this material is that any grease, oil or other foreign carbonaceous material that is on the shell will NOT BURN OFF as is the case with ordinary steels, but will enter the shell and combine with the chromium component within the austenitic stainless analysis causing carbides to form as an intergranular network. Thus,

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the condition, as indicated previously in Figs. 2 and 3, will occur with a subsequent loss of corrosion resistance of the shell. When this does occur, the prime purpose in the selection of the austenitic stainless has been defeated.

The following points should be checked in order to maintain trouble-free operations:

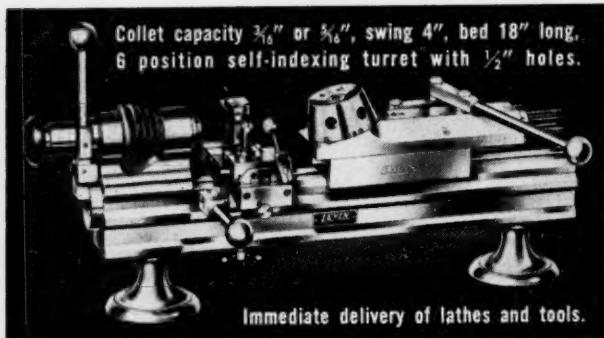
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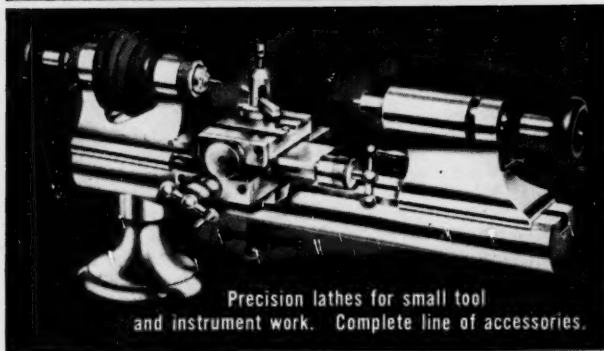
(b) Determine any possible contamination of other lubricants within the wash cycle. Often a heavy base oil may be employed for the drawing of other material which may be deposited upon the stainless shells during washing.

(c) In the event that the more heavy oil lubricants are used or where there may be contaminants within the washing solution, it is well to investigate the cleaning materials that are employed in cleaning. Our practice to have approximately a 2.0 per cent alkali and a 1.0 per cent emulsion cleaner has worked very satisfactory in a spray cleaner for the cleaning of the stainless steels. The use of a modern solvent type degreaser may also prove beneficial.

(d) After the washing operation, the shells should be protected from contamination prior to annealing.



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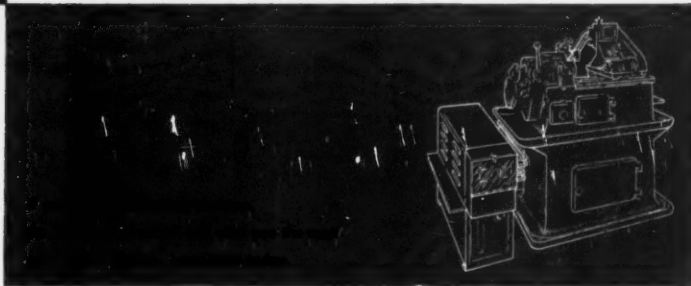
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Thus, the operator should use clean gloves in the removal of shells from the spray washer. Also, where shells are placed in crates, the crates themselves should be clean and further protection given by lining the crates with a heavy grade paper. Where these crates are stored or transported to the annealing furnace, it may be well to cover these crates with paper so as to prevent contamination.

(e) The use of black light is suggested for periodic examination or 100 per cent examination on critical parts to determine cleanliness.

(f) In annealing, it is necessary to use a temperature of from 1850 to 1950 degrees Fahr. to obtain good annealing; the subsequent cooling should be rapid. Usually air cooling is sufficient for thin gauge material, whereas a water quench may be necessary for the heavier gauges.

Conclusions

One of the difficulties encountered in the press working of the stainless steels, is the lack in understanding the characteristics of this type material. Thus, the duties of a foreman of the press-room should not end at the point of drawing the shape, but also to the extent of both washing and annealing procedures which may follow. In many instances, the former phase, washing the drawn article, is under the jurisdiction of the press room foreman and the condition in which the article will

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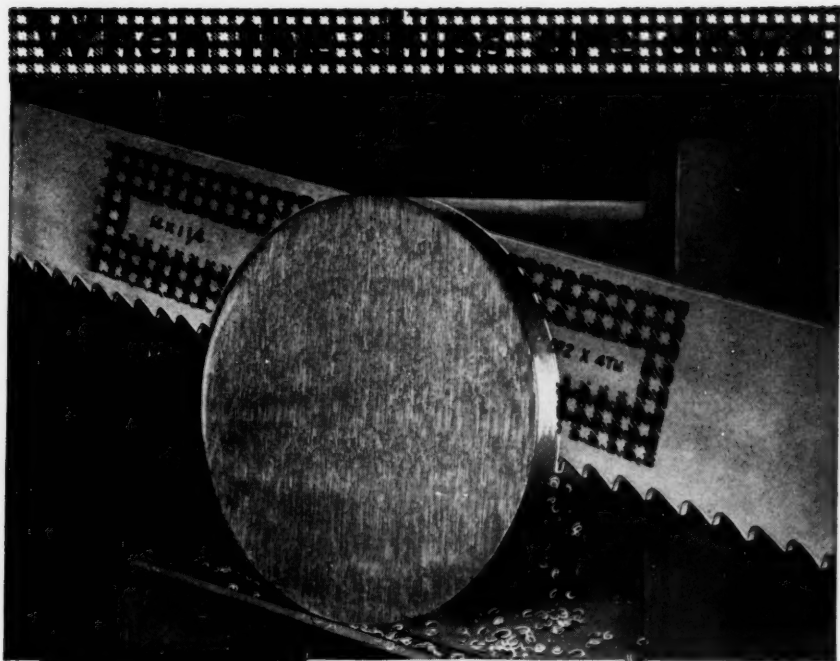
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leave this operation is of extreme importance. Thus, the choice of lubricant, such as the dry film, will aid considerably in the simplification of the cleaning operation. Also, where less easily removed high duty lubricants are employed, the establishment and maintenance of the chemical cleaners within the washer should be a must.

The realization that the austenitic stainless steels have very different characteristics than the ordinary press materials used is also important. Thus, here again, the importance of burrs; the understanding of the cold working tendencies of the austenitic stainless steels; the establishment of proper draw sequences to obtain reductions and not obtain "stress cracking"; the maintenance of the sharpness of cutting tools such as is exemplified in blanking, shearing, punching, and many more, must be thoroughly understood, not only by the foreman, but also by the men who work directly under him. The stainless steels are not difficult to work once the individuality of this material is recognized.



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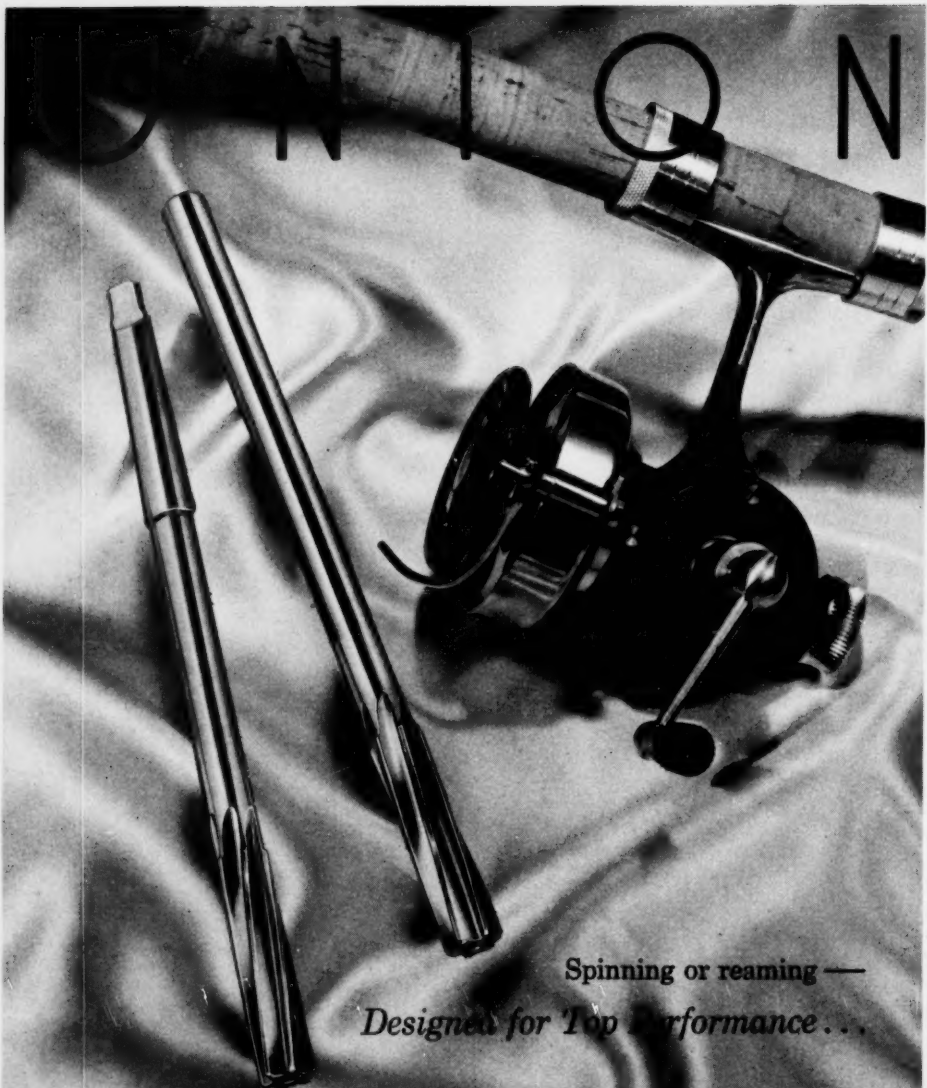
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Die Maintenance

By A. PETERSON*

This article is specifically concerned with the die alignment phase, pointing especially to the use of standard die sets.

ONE of the major problems of both design and maintenance in the manufacture and use of dies is the problem of alignment and maintenance of alignment; also, maintenance of die clearances during construction and production use of dies. This is a greater problem in the smaller die category, more specifically the cutting type of dies as represented in the progressive or multiple and single-station dies.

The term "sub-press," as can be found in some older textbooks, is also used as a term for die set by some of

the tool and die people throughout the country. This term "sub-press" or "die set" as we know it today is meant to accomplish the constant and accurate alignment of the upper and lower members of the die. The degree of accuracy to which this is maintained is directly relative to the design or mechanical principle used to obtain this alignment.

The importance of the alignment of the upper and lower members of the die can be better understood if consideration is given to the average accuracy of the punch presses in which they are used. The average punch press has sufficient deficiencies, such as gib clearances due to normal wear and out-of-parallel conditions of the ram and the bed due to normal die changes caused by handling and repeated setups on basically soft materials, such as steel and cast iron. These errors, magnified by the tonnage required to perform the required function of the die, reflect themselves in myriads of forces and thrusts within the die itself. These forces and thrusts always seek the path of least resistance; thus, a die with insufficient sta-

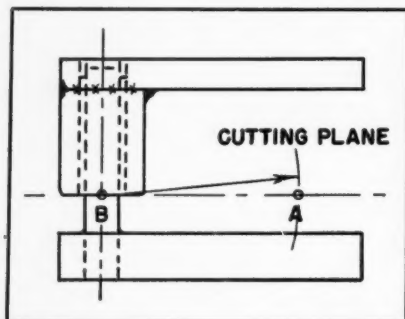


Fig. 1—This sketch represents the correction of the misalignment due to instability and triangulation. The pivot point is brought down to, or below, the cutting plane. This reduces the errors of alignment caused by press irregularities, irregular forces, and thrusts within the die itself.

* General Superintendent — Defense, Nash-Kelvinator Corporation, Aircraft Engine Plant No. 5.

bility to overcome these forces will shear itself, chip cutting edges, break punches, produce irregular break lines, and show large irregular burrs at cutting areas, and so on, on the part produced.

After giving this problem serious consideration throughout the years, our experience has proven that a very simple application of mechanical principle will solve this problem. The accompanying sketches, as shown in Figs. 1, 2, and 3, are almost self-explanatory. As can be seen, this problem develops because of a triangulation factor. There are other factors also which do contribute to the problem, such as pin deflection, bushing and pin fit, bushing and pin contact areas, and so on.

Figure 2 represents the design principle applied by many of those in the die industry; it also shows the triangulation developed between the points A, B, and C relative to the cutting plane. It is a very simple thing for most anyone to determine the potential error of alignment at the cutting edge, point A, when fixed values for this triangle are applied from the die in question. It has been the experience of the writer that where this particular condition has been at its worst, the diemakers during construction would complain of not being able to maintain proper die clearances when setting up the sections; and, as can be seen, where close die clearances are involved, the tolerance of fit between bushing and pin on the commercial set would cause the steels to shear in or ride up; depending on the out-of-parallelism allowed by its alignment.

Figure 3 illustrates this condition. It can also be illustrated very effec-

tively in your shop by setting a punch and a die member with the necessary clearance and then with a predetermined jack placed under the forward part of the die, gently tap the rear or guide pin area down. Now, using a light or some other method, your eyes will be opened when looking through the underside of the die. What you see

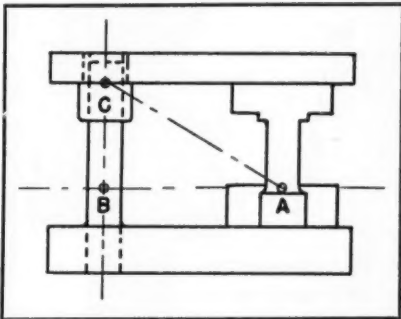


Fig. 2 — This sketch illustrates the standard practice as found in use by many small die builders and users. It illustrates the triangulation developed when this standard type of design is utilized.

is exactly what takes place in the die operation; when coupled with the die press, the condition worsens because of the thrusts and tonnages that are involved.

The solution to this problem is very apparent and is summed up in Fig. 1. What has been accomplished in Fig. 1 is this:

- (1) The integral part of the upper shoe has been brought to, or below, the cutting plane.
- (2) The triangulation has been reduced to the consideration of an arc. The pin length has been cut down, reducing substantially pin deflection during operation.
- (3) Straight bushings of greater contact area can be used, giving

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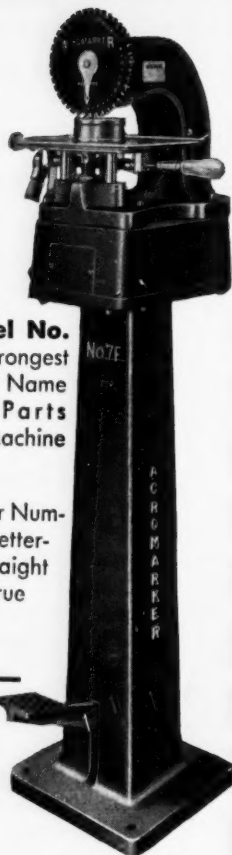
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- (5) A natural reservoir for lubricant is present on the top of the bushing when item No. 4 above is true.

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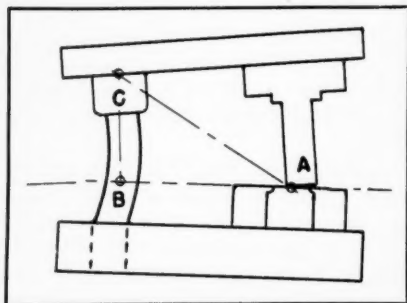


Fig. 3—This is an exaggerated illustration of what happens when a design as illustrated in Fig. 2 is used. Point C becomes the pivot point and any misalignment caused by normal press variation and unequalled distribution of forces and thrusts within the die is reflected in misalignment of the cutting or working edges of the die. The angles of misalignment are proportionate and directly related to the working or cutting edge in the die. It can be seen that in dies constructed in this manner—especially dies using thin material where the die clearances are no greater than 0.001 to 0.002 inch—all of the potential error evident in this design makes it wholly unsatisfactory.

make very simple experiments in his die construction and production to recognize the value of this principle of correction. We, at Nash-Kelvinator, have incorporated this principle 100 per cent on all dies where this principle becomes a factor for consideration. Our maintenance costs have definitely been reduced as a result.

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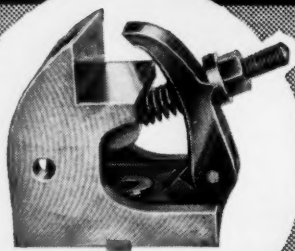
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In inaugurating this principle, several die set manufacturers cooperated to give us these die sets for our requirements. In fact, one die set manufacturer revised his catalog to incorporate this feature. (For obvious reasons, the manufacturer is not named.) The additional cost involved is very nominal and insignificant when compared with the advantages gained.

It is the writer's hope and desire that through the conveyance of our experiences to other people with like problems they may find in this article a solution to a few of those repeaters which keep knocking at the tool-room door for sharpening and maintenance. It can also be seen from the above illustrations that construction of progressive dies is facilitated when principally accurate methods of alignment are used.

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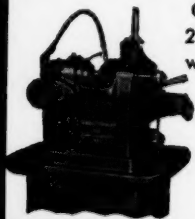
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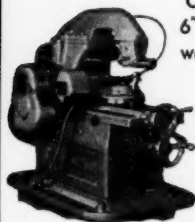
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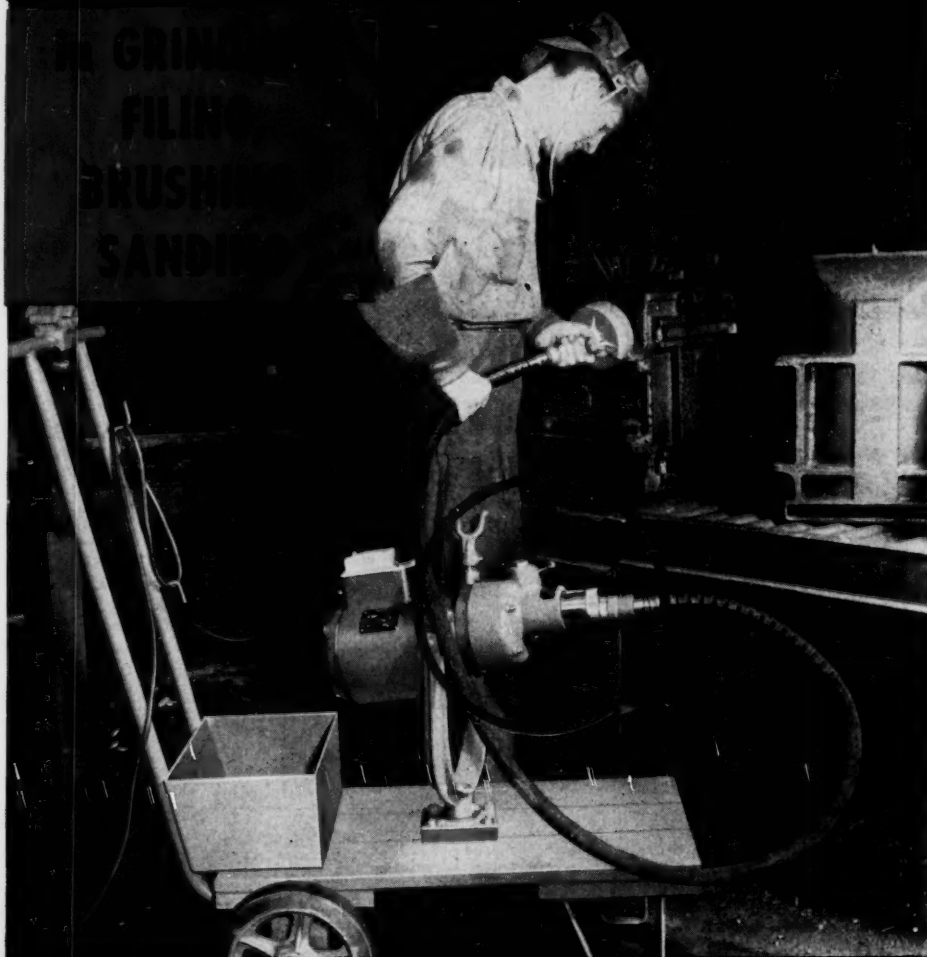
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Gaging Broaches By Optical Projection

By B. G. LAWRENCE

This article discusses a unique application of the relatively new science of optical gaging.

OPTICAL gaging now makes possible the checking of all teeth of broaches for tooth form, spacing, and wear for the entire length of a broach. Utilizing the unique design of the optical system of the Kodak Contour Projector with its 1000-watt surface illuminator, broaches themselves can now be gaged optically as well as the product.

The optical system of this projector permits light to emanate from a high

intensity light source located within the cabinet containing the optical system. By means of a telecentric mirror, rays from the light source pour out of the same optical system as is used for projecting the image of the part onto the view screen. A 45 degree mirror attachment placed over the front relay lens bends the light coming from within downward, upward, or sideways as may be required. As it strikes the part held in the focal plane, the image of

this part is reflected back through the same optical system on to the viewing screen. This image on the viewing screen is magnified 10, 20, 31.25, 50, 62.5 or 100 times as may be desired. Changing from magnification to

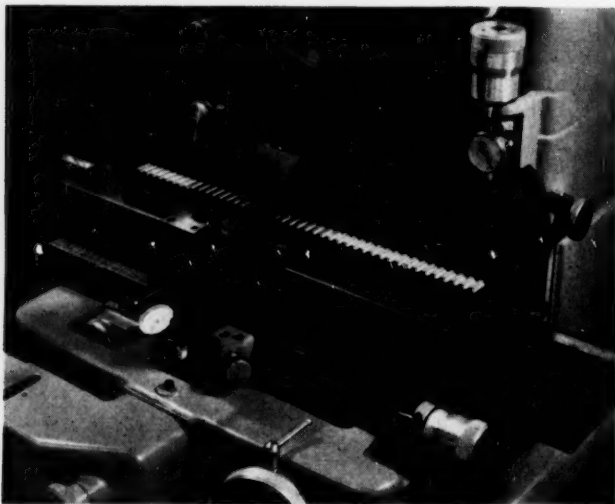


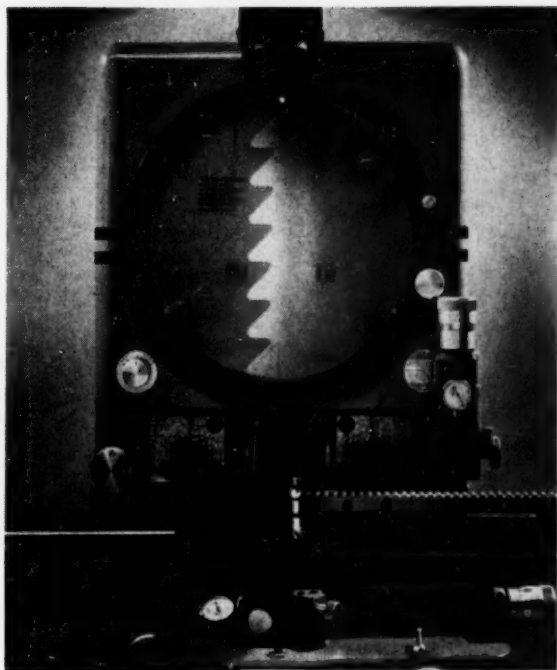
Fig. 1—Specially designed broach locating fixture on work stage. Note indexing notches.

Fig. 2 — Forty-five degree mirrors and vertical light beam produce silhouette of tooth form.

another is accomplished by merely turning the selection dial to the magnification desired.

A specially designed broach locating fixture is placed and locked on the work stage of the Model IIA Kodak Contour Projector, as shown in Fig. 1. The base of this fixture is approximately 34 inches long; however, this can be made longer if necessary. On this base is mounted a broach-carrying slide and indexing head. The slide is moved on accurately scraped ways by merely turning whichever of the pinions is meshing with the rack attached to the rear of the slide. Two black handwheels at rear of the fixture are conveniently positioned for the operator.

The broach, as placed on the fixture, rests against mounting blocks of the indexing slide member and against a magnetic stop at the end of the slide. The magnetic end stop is adjustable to allow for lateral adjustment of the broach if necessary without moving the entire fixture or work stage. When checking various teeth, the broach is indexed across the path of the optical system in accordance with accurately positioned indexing notches, as shown in Fig. 1. The indexing head is fixed to



the base member of the fixture, and carries two special metal mirrors which can be moved as a unit in and out between the teeth of the broach to positive stops at each end of its travel. Positioning this mirror assembly against the forward stop places the mirrors on either side of a row of teeth for tooth-to-tooth inspection. Inadvertent forward thrust of the mirrors against the broach is prevented by a stop pin which must be raised in order to allow forward movement of the assembly toward the broach. Pulling the index handle first removes the mirror assembly from the broach and secondly pulls the stop from the index bar, in a double action.

An adapter is supplied with this fixture which is inserted behind the

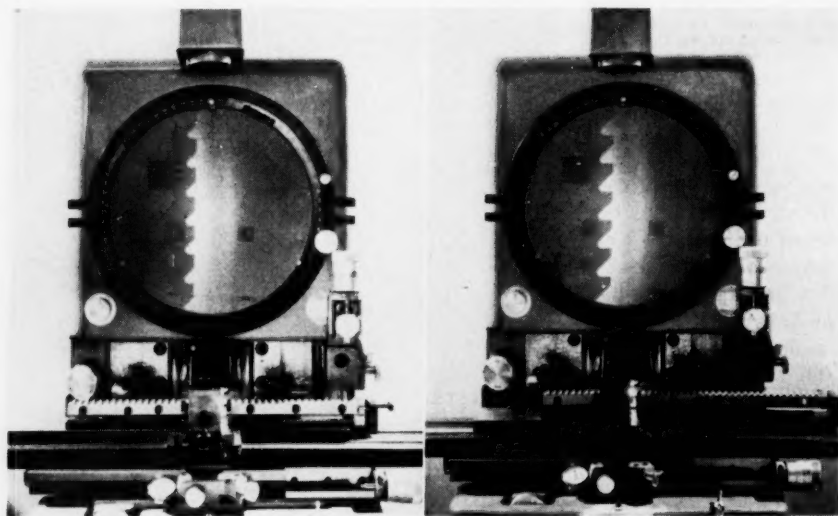


Fig. 3—As the fixture is indexed, the entire length of the broach is checked.

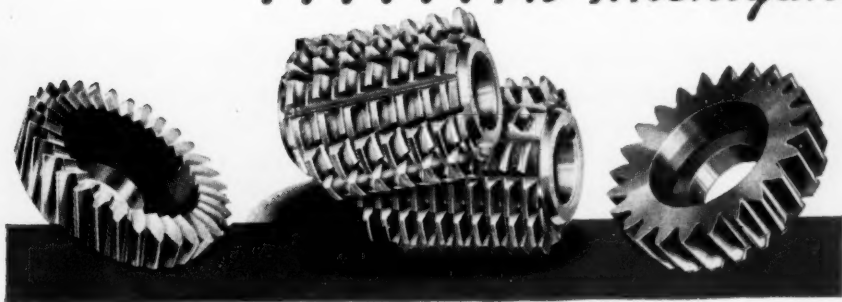
standard 45 degree mirror attachment of the Kodak Contour Projector. This is used in order to extend forward the focal position for the broach. Light coming from the 1000-watt surface illuminator out of the optical system is directed by means of the 45-degree mirror attachment downward toward the two special metal mirrors as positioned flanking any one row of broach teeth. The light striking these mirrors is reflected toward the opposite metal mirror and then returned upward through the same optical system from which it came. This results in a silhouette shadow of the tooth form being projected at desired magnification onto the viewing screen, as shown in Fig. 2. Figure 3 shows profile of cutting edge of the teeth at different sections along the broach. (There are other possible arrangements of mirrors to achieve particular results.)

The contour of the teeth are check-

ed against precision made lines on the chart-gage viewing screen, and any deviation of tooth profile to the master chart-gage lines are readily noted and can be measured. Magnification used as shown in these illustrations was 20 times, although provisions were made for checking at 50 times the tooth form on the same chart. This is accomplished by merely dialing the lens selector to 50X as desired. A screen image can be obtained of the front cutting view, top view, and rear edge view when desired by this method. The two special metal mirrors are separately adjustable right and left to allow for various thickness of broach teeth and adjustable in the vertical direction to allow for various form depths. These adjustments are made only when changing from one type of broach to another and are then locked in position by means of set screws provided.

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Special Setups for Pantograph Profiling

By JOHN E. HYLER

The author discusses two interesting master setups for profiling intricate workpieces.

WORK produced on the modern pantograph machine is usually handled by manually traversing the tracer stylus over the master pattern in use. However, there are various instances where, on repetitive work, it has been found advisable to make use of some type of automatic tracing arrangement. Considerable ingenuity of design is displayed in some of the special masters which have been developed.

One highly interesting piece of work for which a special motorized spring-tension master has been developed and used to advantage is shown in Fig. 1. This workpiece is a multiple mold for medicinal capsules and contains 210 elliptical cavities. Both the inside and

outside walls of each cavity must be properly profiled. Obviously, since the profile of each elliptical cavity is precisely the same, only one elliptical master is required.

This elliptical master, which is made twenty times oversize, can be seen at the top of the pantograph machine in Fig. 2. A duplex driving arm is mounted on a power-driven rotating shaft in the center of the master. The stylus is arranged so as to cut the side of each cavity; spring tension is provided to hold the stylus in contact with the inside edge of the master. When profiling the outside wall of each cavity, the stylus is transferred to the opposite end of the duplex arm, which holds it under spring tension against the outside edge of the master.

If desired, cavities of different sizes can be profiled from a single master by changing the pantograph reduction

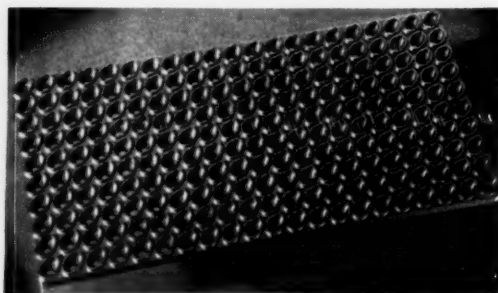


Fig. 1—Multiple mold for medicinal capsules made with the aid of special motorized spring-tension master shown in Fig. 2.

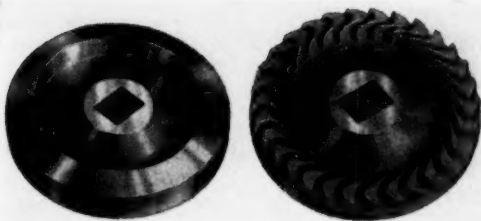


Fig. 3—Impeller blade before and after profiling.

ratio. The down-feed of the machine spindle is automatic; however, indexing from cavity to cavity is effected manually. This motorized spring tension master was found to have saved 35 per cent of the time that was previously required for the job where the tracing method was entirely manual.

Some forms of repetitive profiling require the stylus to traverse an irregular path of a type where spring tension cannot be adapted for the purpose. An interesting solution to some of these problems is based on the fact that a suitable endless chain can be smoothly traversed through a ground slot of proper outline. One instance of this kind was the profiling of the impeller blade blank shown at left in Fig. 3 to the form shown at the right. This impeller blade consists of alumi-

num alloy, has a 1¾-inch outside diameter, and includes 30 vanes. Figure 4 shows the master setup used in profiling these tiny impellers. The master is made 35 times larger than the work size. It is common practice in pantograph profiling to make a master many times larger than the work in the interest of high accuracy, since any error in the oversize master is reduced in the work accordingly. In the case under discussion, however, there is an additional reason for making the master so much oversize, since, by so doing, all curves in the master slot can be made of sufficiently large radius for free movement of the chain—an arrangement not possible otherwise.

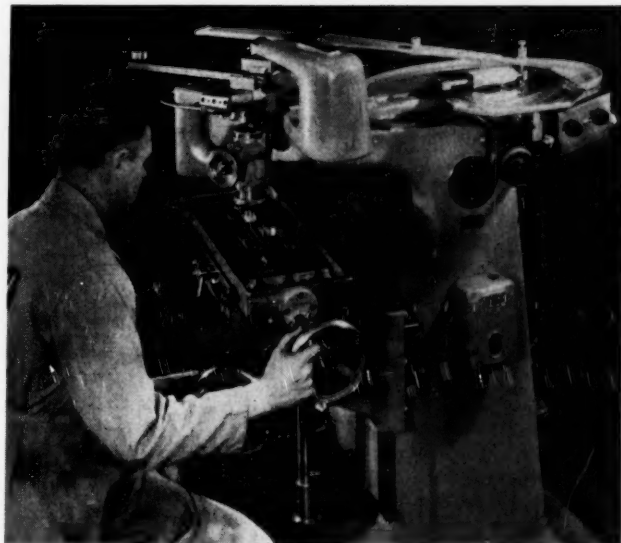


Fig. 2—Master setup used in profiling multiple mold shown in Fig. 1.

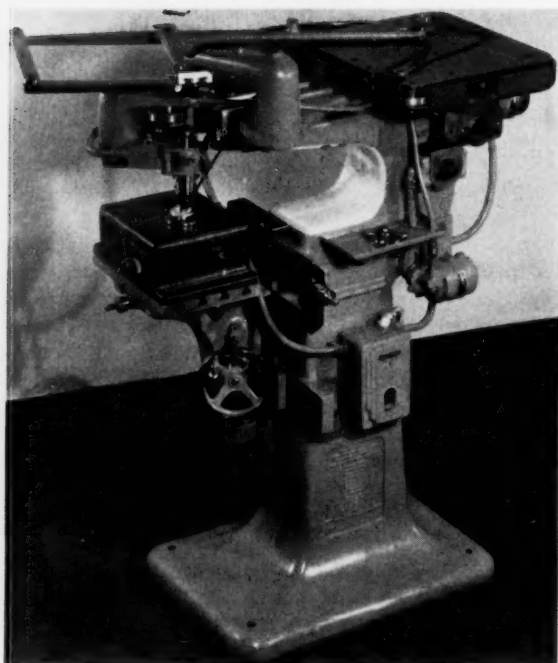


Fig. 4—Master setup used in profiling tiny impeller shown in Fig. 3.

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Referring to Fig. 4, the ground slot in the master can be clearly seen. The endless chain operating in this slot is powered by its own motor through a suitable sprocket. All vanes of the workpiece are milled directly from the solid, the complete cutting cycle for one workpiece being 30 minutes. The machine provides automatic feed for the cutter. Indexing of the workpiece between cutting phases is also effected automatically.

(Illustrations courtesy George Gorton Machine Co., Racine, Wis.)

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Calculating Screw Size for Press Tool Construction

By FEDERICO STRASSER

The author presents a simple method for determining the proper size screws to use in assembling punch and die units.

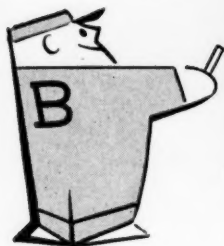
SCREWS and bolts employed in the construction of press tools are practically never calculated as to the proper size for the operations performed by the tools. They are simply chosen by personal judgment and practical experience. However, the proper screw sizes to be used can be determined and, in this article, we present a simple method for making such a calculation, both as to the screws which are used to fasten the stripper to the die plate and those which are used to clamp together the punch holder plates (the top one with the shank and the bottom one which contains the punches). Incidentally, practically the same values may be applied for the clamping bolts which are used to fasten the tool (or the die set) on the press table.

The basis for this calculation is the stripping pressure. It is virtually impossible to make a determination of the stripping pressure by an exact mathematical computation. Essentially, it depends on several variable factors; namely, thickness of stock, cutting perimeter, kind of stock (its phy-

sical properties), clearance (between punch dimensions and corresponding opening in the die plate), surface finish of punch, rigidity of the stripper plate, and so on. At any rate, it can be assumed with a great deal of safety that the stripping pressure does not exceed 10 per cent of the cutting pressure.

Automobile body shops employ the following method: 3,500 lb. per each square inch of cutting surface (cutting perimeter x stock thickness). Since this method, in the case of steel sheet, provides much lesser values than 10 per cent of the cutting pressure, we shall stick to our assumption as stated above (stripping pressure=10 per cent of cutting pressure). Once the value of the stripping pressure is established, we must determine the number of fastening screws. This is almost always an even number—two for small dies, four for medium size tools, and six, eight, or more for large dies. Now, dividing the total stripping pressure by the number of the screws, we get the unitary load for each screw. This is the basis for the calculation (or se-

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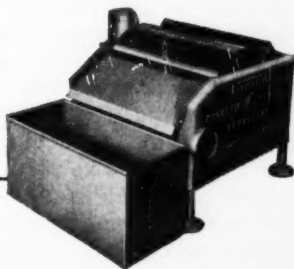
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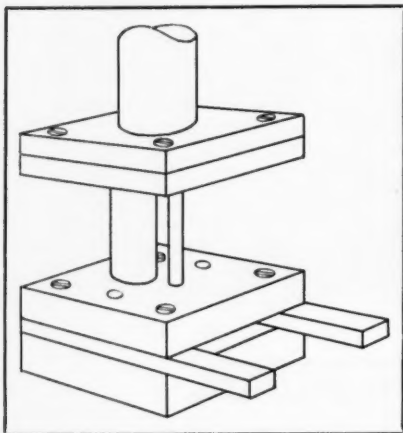
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lection) of the screw size.

The following simple method serves for the determination of the screw size; the tensile strength of a bolt is calculated by multiplying the thread root area by the tensile strength of the material of which it is made; the product is finally reduced by a safety factor of about one to five. A practical



Sketch of small two-station piercing and blanking progressive type die in which four screws each are provided for both the stationary and movable parts of the die.

example, taken from the author's own experience, illustrates the calculation method as outlined above.

We had a small two-station piercing and blanking progressive type die in which the total cutting length was 1.80 inches. Since the stock was 14 gauge (0.0747-inch) mild steel sheet, the total cutting pressure was $P_1 = 1.80 \times 0.0747 \times 55,000 = 7,400$ lb. There were four screws each for both the stationary and the movable parts of the die (see accompanying sketch); therefore, the load for each screw was $7,400 \times 0.10 \div 4 = 185$ pounds.

The formula, in general, for the screw strength is:

$$P_2 = \pi d^2 \div 4 \times K \times F \text{ where}$$

P_2 is the maximum safe load in lb.

d is the root (or minor) diameter of the screw thread in inches

K is the tensile strength of the metal of which the screw is made in lb./sq. in. (in our case we took a machinery steel with 60,000 p.s.i. tensile strength)

F is the safety factor (in our case, since the load suddenly varied, we took $1 \div 12$; i.e., 8.3 per cent or 0.083)

Substituting in the formula the figures of our case, we have:

$$185 = (3.14 d^2 \div 4) \times 60,000 \times 0.083$$

from which

$$d^2 = \frac{185 \times 4}{3.14 \times 60,000 \times 0.083}$$

$$740$$

$$d = \sqrt{15.637}$$

$$d = \sqrt{0.0473}$$

$$d = 0.217 \text{ inch}$$

To this i.d. (minor diameter or root diameter) corresponds a standard thread size of $\frac{5}{16}$ -inch screw (minor diameter, 0.02403 inch) which has been, in fact, selected.

According to our experience and observations, screws for press tools are almost always too amply chosen, especially for thin stock. However, it is convenient to check their number and size when the stock is thick (say, over 0.1 inch thick) and tough (high shearing or tensile strength).

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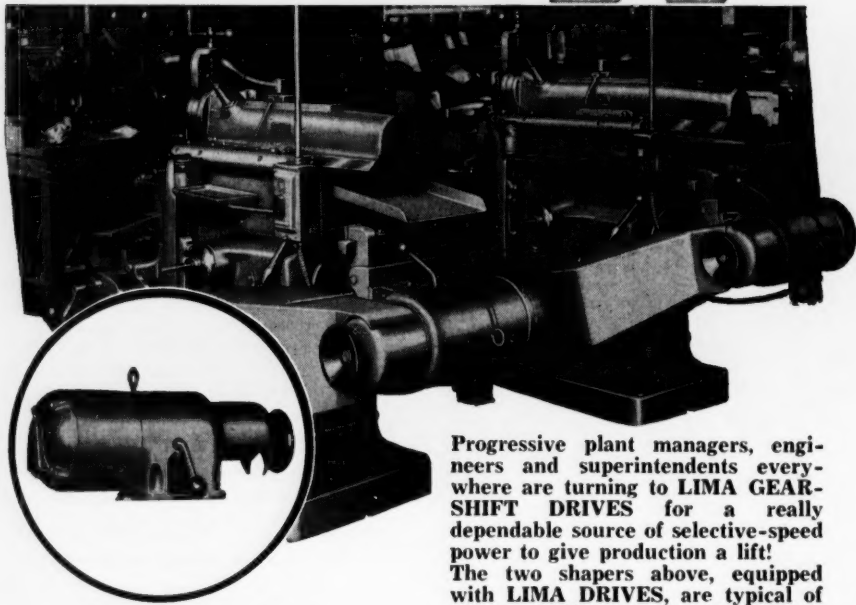
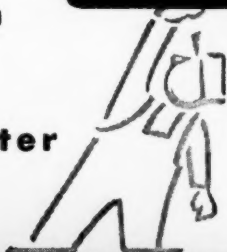
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ideas from readers

Method for Salvaging Used Plug Gages

By A. C. ADAMS

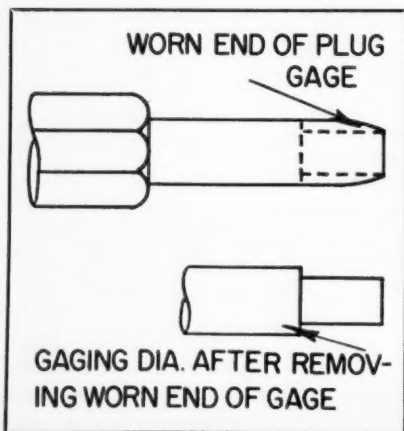
IN our shop, it was customary practice to discard plug gages that were worn on the ends to a point where they were no longer usable. Rather than apply a layer of chrome to the worn gages and then regrinding same to size, we found that it was considerably more economical to scrap the worn gages and make new ones. Now,

however, with certain plug gages, we neither chrome nor scrap them, but simply grind away the worn end, as shown in the accompanying sketch, and use the "up to size" diameter for gaging purposes. This salvaging operation is recommended in cases where a portion of the plug gage other than the extreme end can be used for checking purposes.

Device Permits Helix Angle Grinding of Carbide Spar Mill Cutter Tips

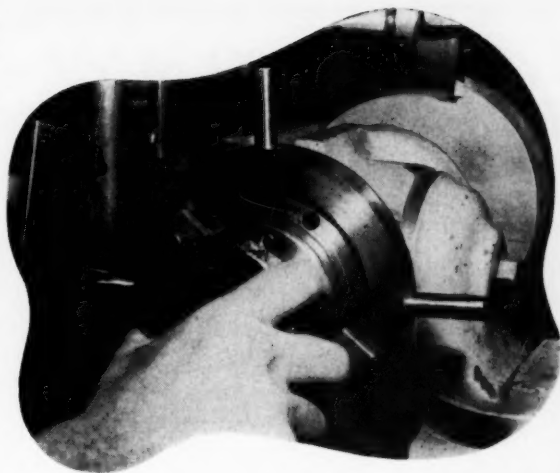
By C. R. CROXTON

A special attachment for use on Cincinnati No. 2 cutter and tool grinders, developed by the writer, a grinder crib leadman at Temco Aircraft Corp., Dallas, Texas, has made it possible to grind carbide spar mill cutter tips with a helix angle facing rather than the flat facing normally



Sketch showing how worn plug gage can be salvaged for further use

This dowel-pin equipped guide wheel, attached to the work head spindle of a cutter and tool grinder, enables spar mill cutter tips to be ground with a helix angle facing rather than the flat facing normally used.



used. The result is a considerable increase in cutter efficiency which, in turn, means less frequent grinding and an estimated 20 per cent increase in tip life. The helical ground face provides a constant rake angle in relation to the center line of the cutter; whereas with the flat ground tip, the rake angle—although constant on the tip itself—often varies as much as seven degrees from one end to the other in relation to the center line of the spar mill cutter.

The main obstacle to creating a helical face has been that it could not be produced on standard grinders due to the accurate spacing required. Once the helix had been ground, however, the tips could be sharpened with no difficulty. The author overcame this

problem with the device shown herewith which consists of a guide wheel attached to the work head spindle. This wheel has four dowel pins or spokes pressed into holes which have been drilled at 90-degree intervals in its outer rim.

In operation, the spokes slide on an adjustable guide or straightedge as the work is fed to the diamond grinding wheel. This movement causes a spiraling action on the part of the work and results in the grinding of the desired helix angle face rather than a straight angle face.

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Size 9"x16"

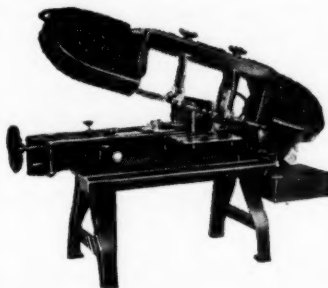
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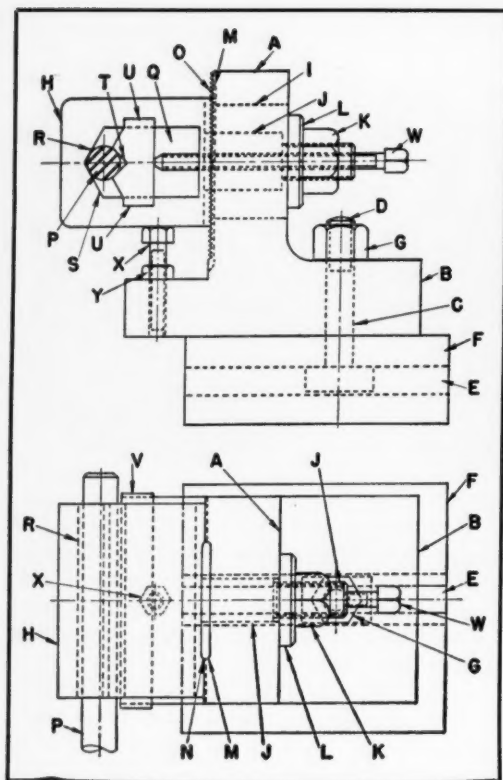
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Sketch of precision boring bar holder for centertype lathes

Precision Boring Bar Holder for the Lathe

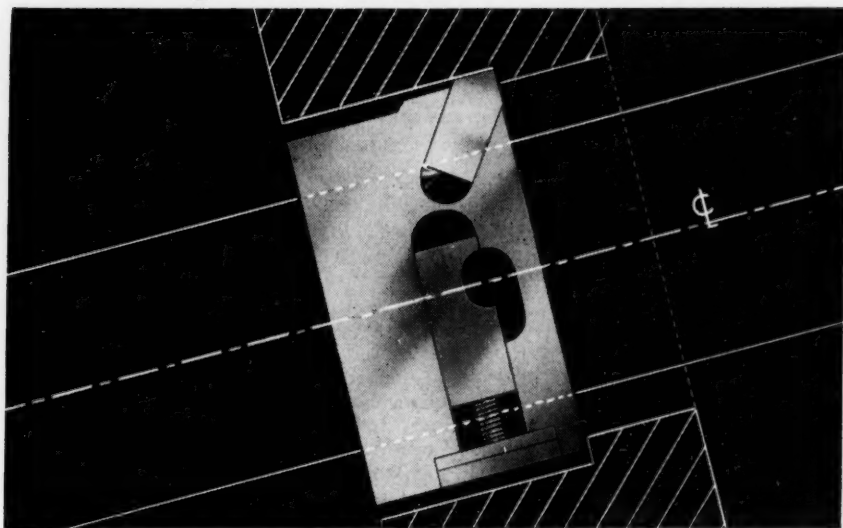
By W. M. HALLIDAY
England

THE accompanying sketch shows an effective toolholder for use with centertype lathes, the purpose of which is to provide an improved means for correctly mounting and firmly retaining ordinary cylindrical boring bars, or round shank threading tools and so on, in machining deep holes and performing other operations. The holder comprises a bracket, A, the upright column portion of which is at

right angles to the base, B. The section of base B situated to the right of the column is made considerably longer than the left-hand portion and is provided with a drilled hole, C, for the purpose of accommodating a large square-headed hold-down bolt, D. The bolt head has a sliding fit in the T-slot E of the lathe cross slide F. The hexagon nut G serves to clamp the bracket A to the lathe cross slide, the standard toolholder being completely removed from the slide.

Fitted with a minimum amount of side play through a hole, I, machined in the column of bracket A is the rectangular shank J of the holder block H. The end of the shank is turned cylindrical and threaded to accommodate the nut K. A thick steel washer, L, is interposed between the nut and the side of the column of bracket A. The left-hand side of the column is relieved in the center for about half the total width, as shown at M. The endface of holder H is similarly relieved at N, providing two pairs of matching bands which are finely serrated, as shown at O, the serrations being parallel with the base B. These serrations serve to lock the holder and the bracket firmly together as a unit when the nut K is tightened.

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The cylindrical boring bar **P** is mounted in a slot, **Q**, machined fully through the holder **H**. The left-hand end of the slot includes a wide vee, **R**, for accommodating various sizes of boring bars. Fitted to slide freely within slot **Q** is the block **S**, the left-hand end of which includes a 90-degree groove, **T**, much smaller than groove **R**. The same end of block **S** is machined in such a manner as to allow it to

be moved into groove **R**. To prevent the block from moving laterally in slot **Q**, two identical projections, **U**, are formed integrally with the front side. These projections pass over the front side of the holder **H** a short distance, as shown. At the opposite (rear) side of the block, a keep-plate, **V**, is fastened by means of screws, the ends of the plate extending the same amount over the top and bottom edges

of the slot **Q** as the projections **U**.

Adjustment of the block **S** to suit the diameter of boring bar to be gripped is effected by the long square-head screw **W** which is threaded into a hole tapped through the center of shank **J** and holder **H**. To compensate for down-thrusts produced on the holder **H** during heavy cutting operations, the base portion of bracket **A** to the left of the column is drilled and tapped for the set screw **X**, the head of which may be adjusted to bear on the underside of the holder. Lock nut **Y** serves to readily retain the screw in the correct position.

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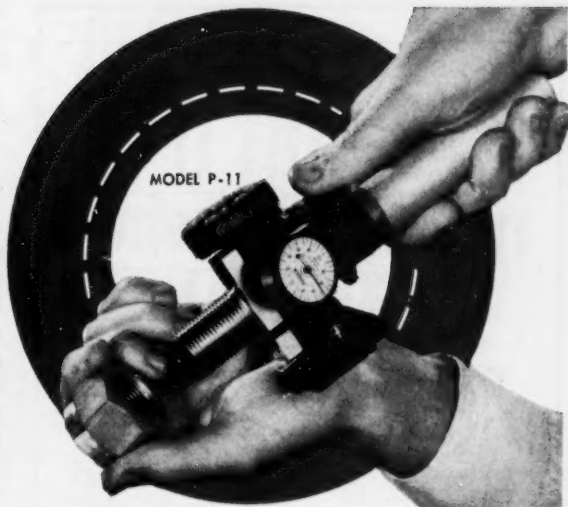
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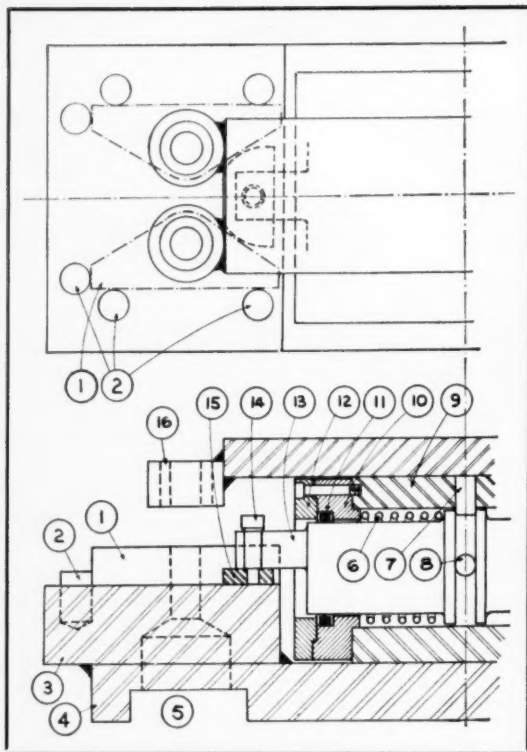
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Sketch showing how one air cylinder with two plungers can be used to clamp four workpieces for drilling in a multiple spindle drill press

Multiple Clamping with Built-In Air Cylinder

By H. G. FROMMER

AN example of how one air cylinder with two plungers can be used to clamp four workpieces for drilling in a multiple spindle drill press is shown in the accompanying sketch. The cylinder is incorporated in a jig, only one half of which is shown. The vertical dash-dot line indicates the jig center line, about which the jig is fully symmetrical. Parts (3) and (4) comprise the welded jig base. Pins (2) serve to locate the work (1) which is shown in dash-dot in the top view. The work

rests on the finished top surface of base (3) while the cylinder block (9) is bolted to the jig base (4) after machining. The air inlet is indicated by (8), while pin (7) separates the two plungers (13) so that they will not cover the air inlet or interfere with each other. Two caps (10) and (12) provide effective sealing by sandwiching O-ring (11) with leather back-up washers. A spring (6) returns plunger (13) as the air is exhausted. The front end of the plunger is machined to accommodate an equalizer (15) which pivots around bolt (14) and then clamps two workpieces uniformly, even though their outlines may not be exactly alike, as is often the case with flame-cut parts. A drill plate is bolted to the top of cylinder block (9), and bushings (16) provide guidance for the drills. Clearance holes beneath the work and chip channel (5) facilitate chip removal.

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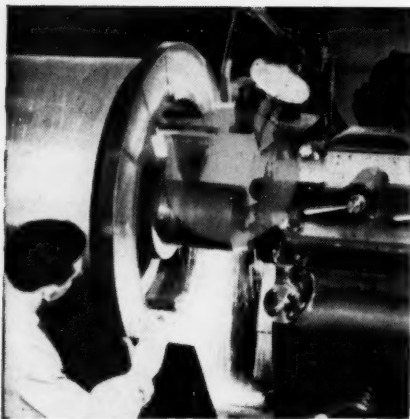
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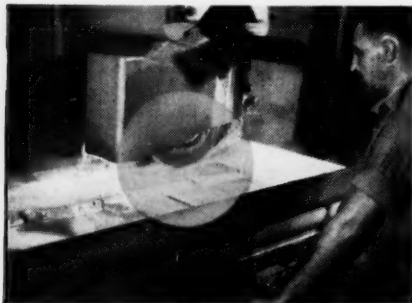


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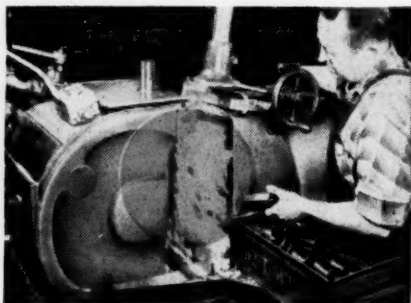
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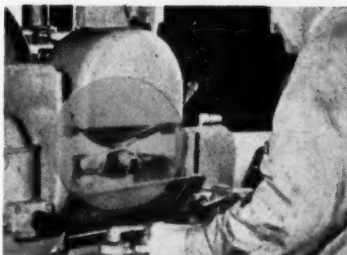
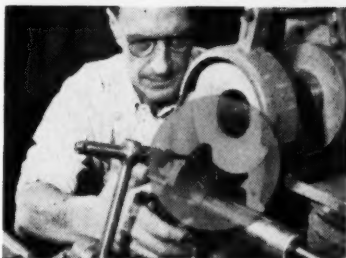
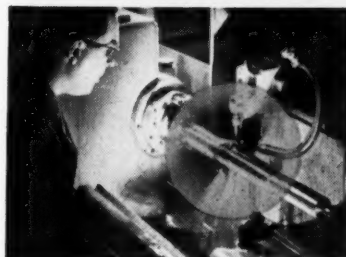
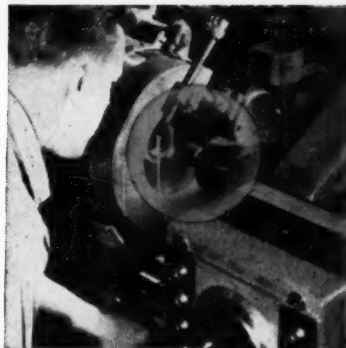
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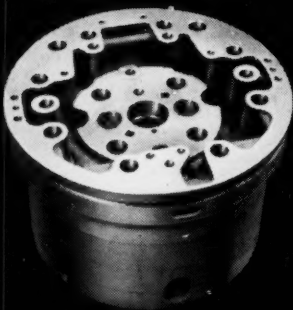
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Twin Machine Setup Used for End-Finishing Welded Steel Tubing

AT the Kold-Hold Mfg. Co., Lansing, Mich., two Pines No. 600 air-operated end-finishing machines are employed for machining $\frac{3}{4}$ x 0.028 x 13 17/64-inch welded steel tubing (S.A.E. 1010-1020) to precision limits. Production under the twin setup averages 600 pieces per hour.

As shown in the accompanying illustration, the machines are bench-mounted adjacent to each other. One

man operates both machines simultaneously by means of a single foot control which initiates the automatic clamp, feed, and return cycle for both machines, thus freeing the operator's hands for load and unloading purposes. The machine at the operator's left is especially tooled to handle an inside and outside deburring and facing operation on one end of the tubing. As soon as this operation is completed, the operator flips the workpiece a half-turn, catches it in mid-air with his right hand, and loads the second machine which performs the same operation

on the opposite end of the piece and also faces the piece to length. At the instant the second machine is being loaded, the operator's left hand is free to reload the first ma-



View of two Pines No. 600 air-operated end-finishing machines being operated simultaneously by one operator. A single foot pedal initiates automatic clamp, feed, and return cycle for both machines.

chine and maintain uninterrupted operation. To further simplify production cycling, the workpieces are supplied to the operator from a main conveyor line and finished pieces are dropped into a near-by basket.

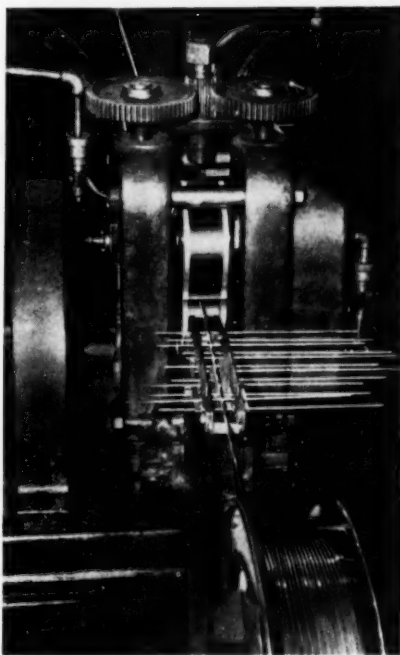
Since precision tolerances on length are needed in this particular job, the second machine is conveniently equipped with an end gage fixture. This attachment, shown in the illustration under the operator's arm, is connected to the feed rack and assures the precision accuracy necessary. Both machines, built by Pines Engineering Co., Inc., 642 Walnut St., Aurora, Ill., are designed for a broad range of end-finishing operations.

Tungsten Carbide Rolls Reduce Wear of Equipment in Rolling Stainless Steel Wire

THE Knowles Loom Reed Works Inc., New Bedford, Mass., which rolls stainless steel wire for loom reeds that the textile industry employs in the process of weaving cloth from natural and synthetic materials, made a plant survey recently in an effort to control costs and improve the quality of its product. As a result of this survey, three things were discovered: (1) The metal rolls used in rolling wire for reeds allowed only a maximum of two weeks' production per spot per roll; (2) as they wore or mushed, the rolls also tended to crown the reed wire slightly and caused rejects, and (3) continuous checking of wire sizes was a must at the start, and during the production run, because the steel rolls expanded and contracted under the heat of the run to produce product variations.

The operation involved rolling the

stainless wire into reeds ranging from 0.005 to 0.025-inch thickness by means of a pair of rolls running at a speed of about 70 r.p.m. To keep the reed wire at a uniform size and to extremely close tolerances, the spot or path traveled by the material going through the



Exit end of Knowles loom reed equipment. Note surface of Carboloy tungsten carbide rolls. After rolling stainless steel wire in one spot between the rolls for better than a year on a 9-hour day, 5-day week schedule, no sign of wear is visible. Previous rolls employed tended to crown the loom reeds if the path of the wire travel through the rolls was not changed every two weeks. Straighteners in the foreground flex the rolled product to remove the cast imparted by rolling.

rolls was changed periodically. This was done by means of adjustable guides. Since the spot of the wire travel became worn in about two weeks, it did not take long on a 9-hour 5-day

week schedule before the whole face areas of the two rolls were worn to a point where replacements were needed.

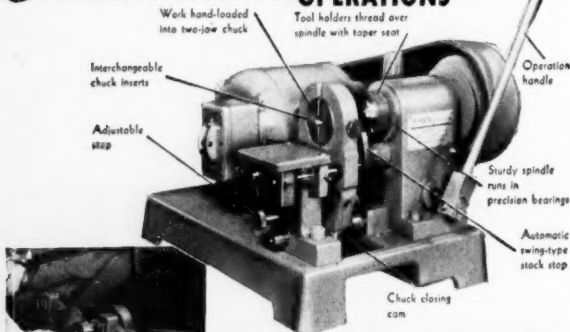
The question was: What could be done to stretch out roll production runs and still produce the quality reeds demanded by the cost-conscious textile industry? The answer came with tungsten carbide rolls especially manufactured by the Carbology Department of General Electric Company,

Detroit. The biggest headache—reed size variations—no longer was a problem while the wire was being processed through the rolls. This first saving produced a second—in manpower. Instead of tying up one man for each machine, a lone operator could handle several machines, and the extra manpower would be utilized elsewhere.

After a 22-month recapitulation of the roll equipment's production effi-

ciency, the company found that roll wear was reduced to practically nil. Instead of changing the rolling spot 24 times a year, as was previously necessary, the company discovered it was rolling stainless steel wire on the same spot on the Carbology carbide rolls a year later, with no sign of wear. Reed wire shape remained stable and unchanged since the hard tungsten carbide rolls produced consistently flat reeds. Moreover, inspection records indicated that variations in reed wire and size and finish due to contraction or expansion of the rolls caused by heat no

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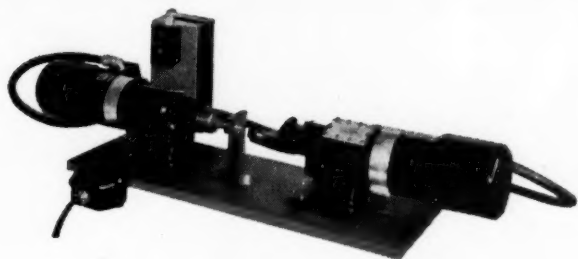
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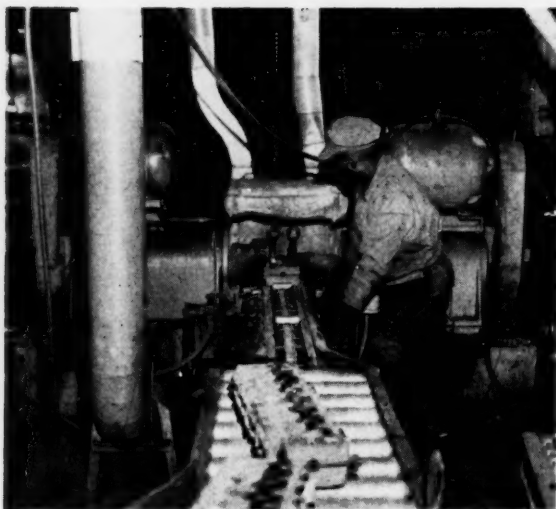
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Automatic **DRILLING UNIT**



Besly No. 630 grinder being used in plant of leading automobile manufacturer to remove rough metal fins from cylinder heads. Castings are conveyed directly to a power-driven feeding fixture which is equipped with spring-loaded shoes to hold down each casting as lug on feed pushes it through the grinder.

longer presented rejects. Furthermore, the high luster of the carbide rolls automatically imparted a luster finish to the reeds, adding to their marketability.

Removing Rough Metal Fins from Castings by Grinding

ONE of America's leading automobile manufacturers has achieved large man-hour savings in the processing of rough cylinder head castings

sary rate of production is currently 1,600 castings a day.

Before the installation of the Besly grinder that is now used for snagging, hand chippers were employed to remove the fins from the castings. This was a tedious process; however, it was production policy to meet the required cylinder head quota daily no matter how many men had to be put on the job. Therefore, considerable manpower was tied up in this one operation.

Now, only one man and a No. 630 30-inch double-spindle dry grinder

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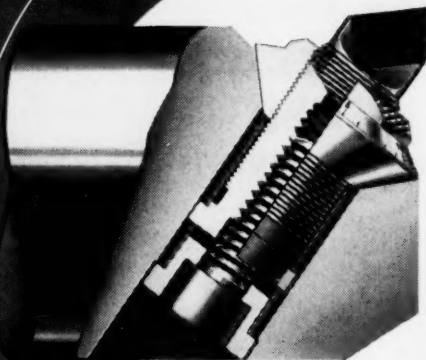
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made by Besly-Welles Corp., Beloit, Wis., are necessary to keep up with production-line demands. The operation is as follows: When the molds are shaken out, the hot castings are brought to the grinder on a gravity conveyor. The grinder operator breaks off larger pieces of excess metal with a few hammer blows and rolls the castings from the conveyor onto a power-driven feeding fixture on the grinder.

The heads are then automatically fed through the grinder, and the fins, $\frac{1}{16}$ to $\frac{1}{8}$ inch thick, are snagged off at a single pass, producing clean, smooth, ready-to-machine castings.

The power-driven feeding fixture as used for snagging cylinder heads is equipped with special guide plates and spring-loaded shoes that hold down the castings as they pass through the machine. The heads are moved by lugs

properly spaced on a continuous chain that is motor driven through a worm and worm gear reducer. The grinder utilizes two 30 x 2 x 6-inch Besly-Titan Steelbac abrasive discs of resinoid-bonded silicon carbide abrasive grain. They are driven through multiple V-belt transmissions by two 25 h.p. totally-enclosed fan-cooled, ball bearing motors operating on 220 volts, 60-cycle a.c. The grinder is equipped with a swinging arm truing device with ball bearing cutters for wheel dressing. Safety features include belt guards and a special welded steel exhaust hood.

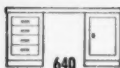
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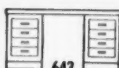


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MAKE SURE OF THREE POINTS

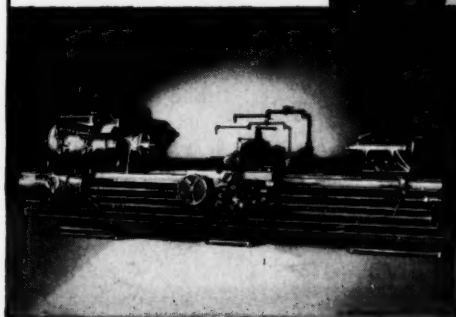
- (1) That all gears are arranged in a horizontal plane, easy of access.
- (2) That gears are in constant mesh, with speed changes effected by means of sliding jaw clutches, eliminating gear wear due to shifting action.
- (3) That the "back gear" is in front of the spindle, exerting its powerful downward thrust to offset the lifting action of the tool when heavy cuts are made.

On these three points long life for engine lathes depends. At these three points Boye & Emmes Long Life, Heavy Duty Engine Lathes excel.

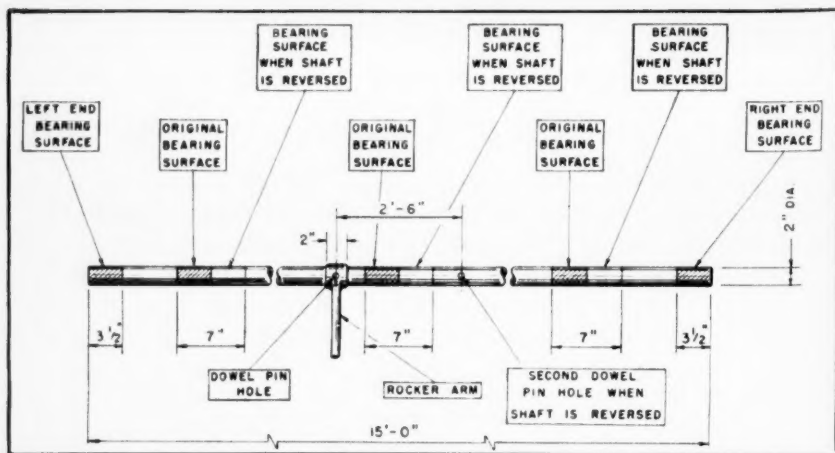
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"Back-gear-in-front" guards spindle bearings during heavy cuts.



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Drawing showing dimensions of bearing areas on textile knitting machine rocker shaft

Metallizing Used in Textile Plant to Repair Knitting Machine Shafts

IN a large Virginia textile plant, metallizing equipment supplied by Metallizing Engineering Co., Inc., 38-17 30th St., Long Island City 1, N. Y., is used in the repair of knitting machine rocker shafts. These shafts are each 2 inches in diameter and 15 feet long and are used to control the up-and-down motion of the "heddle" in a knitting

machine. Each rocker shaft, which is made of cold rolled steel, moves back and forth in five cast iron bearings, each approximately 3 inches long, and is controlled by a rocker arm held firmly to the shaft with a dowel pin. The shaft normally wears on all five bearing areas and can cause inefficient operation unless repaired or replaced. It can be reversed once as indicated by the accompanying drawing.

Each of the worn areas is turned down 1/8 inch on the diameter, rough threaded with a Rex AAA carbide tool,

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and metallized with a 25 carbon steel, using $\frac{1}{8}$ -inch wire in a Metco 2E gun. The metallized areas are then turned down to the original 2-inch diameter.

According to the plant engineer of the Virginia concern, metallizing has reduced by half the time and cost involved with the previously used method for repairing the worn areas on the rocker shafts. Moreover, the plant engineer has stated that a new shaft

costs about \$80 but that none has been purchased since the company began using metallizing in 1944.

High Quality Surface Finishes Obtained in Facing Transmitter Components

HIGH quality surface finishes together with long tool life are

being obtained by a noted manufacturer of precision communication and recording equipment in machining S.A.E. C-118 steel at 1,000 surface feet per minute using standard Kendex tungsten carbide triangular insert tools produced by Kennametal Inc., Latrobe, Pennsylvania.

As performed in the plant of McElroy Mfg. Corp., Littleton, Mass., the operation consists of facing two surfaces of a high frequency transmitter component from a maximum of 4 inches in diameter down to a 1-inch diameter center shaft, as shown in Fig. 1. Work is performed on a $\frac{3}{4}$ h.p.

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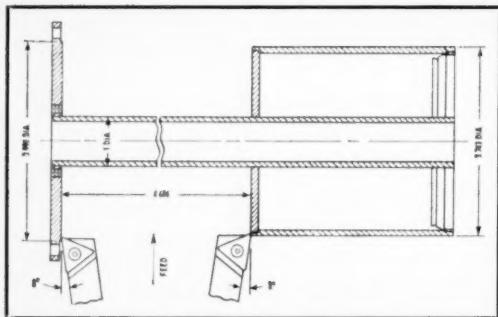


Fig. 1—Facing UHF transmitter component at 1,000 s.f.m. with two Kennametal triangular insert tools. Surface foot rate is maintained throughout cut with variable drive unit to provide mirror-like finish. A total of 360 pieces is faced, after which inserts are replaced, thus eliminating grinding expense.

Logan lathe having a variable drive attachment.

A mirror-like finish is required on each machined surface since it is later plated with a 0.0002-inch thickness of copper over which a 0.0012-inch silver plating is applied. The surface is then buffed down and rhodium flashed to prevent tarnish.

To obtain the necessary machine finish, a surface foot rate of 1,000 is maintained throughout the cut. This is accomplished by varying the revolutions per minute from 1,000 at the start of the cut to approximately 4,000 at the finish by a variable drive unit attached to the Logan lathe and actuated by the toolslide which is fed in at a rate of 0.0045 inch per revolution. As shown in Fig. 2, a chip guard is used to assure that the finish ma-

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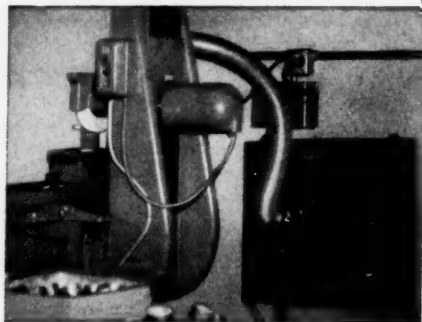
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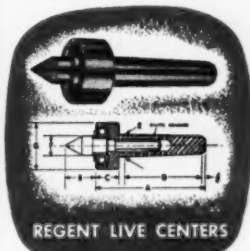
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Three interchangeable points • Replaceable parts and bearings • Hardened and ground points • Precision combination bearings • Positive bearing seal • Sturdy, medium duty tool • Handles large variety of lathe, grinding and milling jobs



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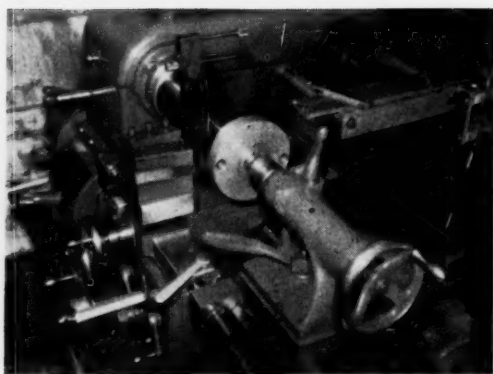


Fig. 2—Facing at 1,000 s.f.m. with Kendex triangular insert tools to obtain mirror-like finish. The r.p.m. is varied from 1,000 at 4-inch diameter to 4,000 at 1-inch diameter by variable drive unit.

chined surface will not be scratched.

At a lower surface foot rate, a satisfactory finish could not be obtained; while at the higher speed, tool life became a problem. The best tool life obtained with the several grades of triangular inserts that were first tried

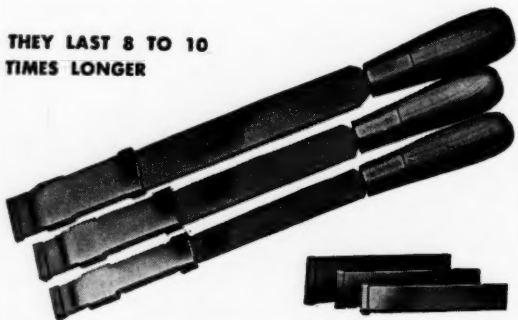
depth of cut is only 0.007 inch, the Kendex inserts of left and right-hand tools are interchanged to machine an additional 180 pieces. A total of 360 pieces is faced, after which the expendable inserts are replaced with new ones, eliminating tool grinding on this job.

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TIMES LONGER



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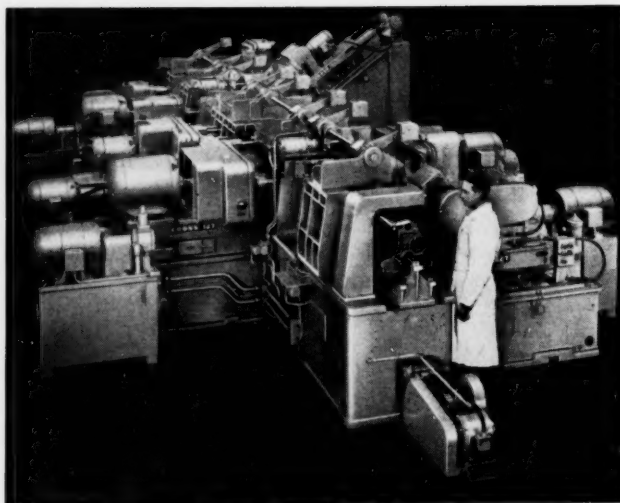


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Automatic transfer type machine tool used in machining tractor cylinder blocks

Machining Tractor Cylinder Blocks

A SPECIAL machine tool of the automatic transfer type has been delivered to a certain manufacturer by The Cross Co., Detroit 7, Mich., for use in machining tractor cylinder blocks. Cylinder blocks are finished at the rate of 71 per hour at 100 per cent efficiency. The operations include drilling, counterboring, and tapping the recess for the oil filter; drilling, counterbor-

ing, and reaming two Welsh plug holes; milling, drilling, reaming, and tapping the hydraulic pump mounting pad; and milling, chamfering, and tapping all miscellaneous holes on both sides of each tractor cylinder block.

The machine has 13 stations—one for loading; one for milling; six for drilling, boring, and reaming; one for tapping; and four for inspection. A hydraulic power operated transfer mechanism moves the work from station to station. The machine incorporates many automatic devices, including automatic chip conveyor; automatic air-oil tap lubricating and cleansing with each cycle; automatic gravity-operated cam clamping; and automatic retraction for milling cutters during return stroke.

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A UNIQUE broaching setup developed by Colonial Broach Co., P.O. Box 37, Harper Station, Detroit 13, Mich., permits the use of a stand-

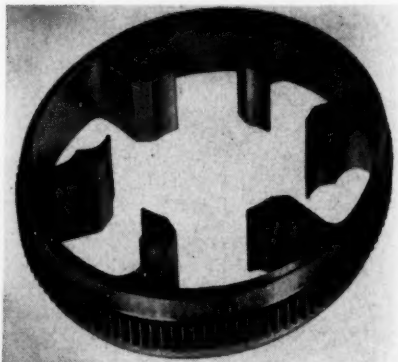


Fig. 1—This aircraft engine part has six contours between the internal lobes which are broached in two passes using the setup shown in Fig. 2.

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ard broaching machine for broaching intricate internal contours of an aircraft engine part of the design shown in Fig. 1. The six identical contours between the internal lobes on the part are broached in two passes—three alternate contours in the first pass and the remaining three in the second pass. A two-station fixture is necessary to facilitate locating from the offset holes in the part. After the first pass, the part is shifted to the second station which is shuttled into broaching position for the second pass.

As shown in Fig. 2, an interesting

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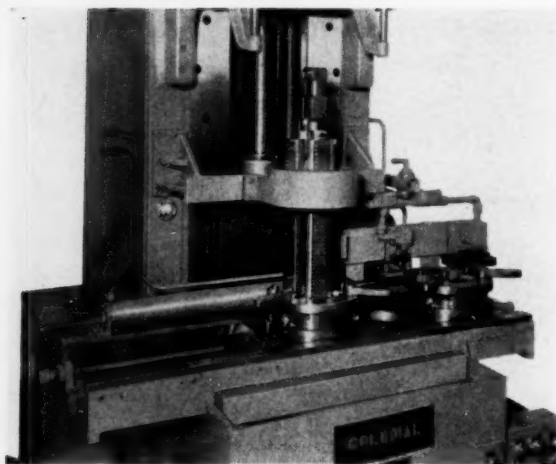


Fig. 2—Three alternate contours between lobes on an aircraft engine part of the type shown in Fig. 1 are broached in the first pass with this single-ram pull-down broaching machine setup. The part is then removed from the first station and loaded in the second station of the side-shuttling fixture for broaching the remaining three alternate contours.

feature of the setup is a built-up type broach incorporating inserted broach sections. The machine used is a standard 15-ton 66-inch stroke Colonial pull-down single-ram broaching machine. Multiple guide shoes guide the broach above and below the part. These shoes, contacting grooves in the broach during vertical travel, ensure high dimensional accuracy.

Twelve dowels in each station of the fixture—six above and six below—engage six holes in the six lobes in the part. Complete support of the six lobes is thus provided while the part is be-

ing broached, holding the thin walled projections so as to effectively prevent any distortion during the broaching operation. The side-shuttling fixture has a central opening through which the broach is returned after each pass. All movements of the shuttle are controlled and interlocked by limit switches and operated hydraulically by the hydraulic system of the machine. The machine progresses through one broaching cycle and returns automatically to its starting position. It is then reactivated for the second pass to ensure that the second station of the work-holding fixture is loaded and in correct position for the next pass of the broach.

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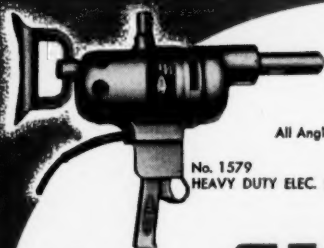
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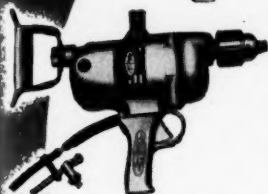
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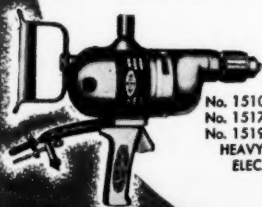
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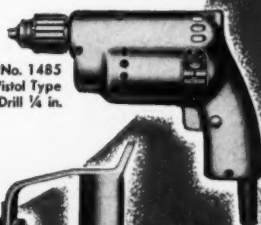
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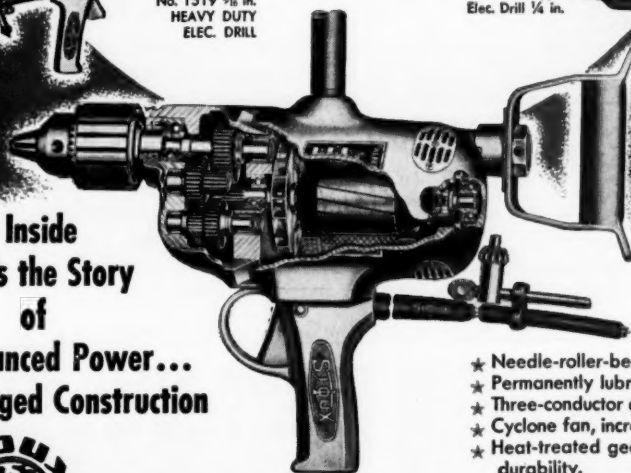
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Rotary Air Feed Applied to Hand Miller Saves Time in Slotting Brass Plugs

THE accompanying illustration shows a simple but unusual application of a Mead rotary work feeder which, although only partially automatic, saved a considerable amount of time compared to the previous method

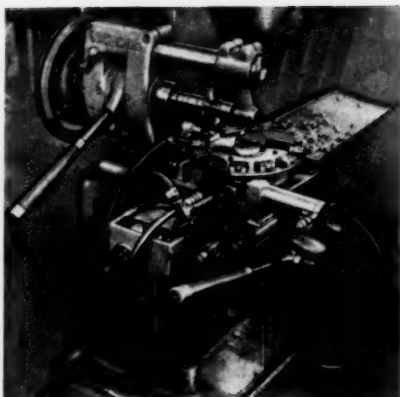
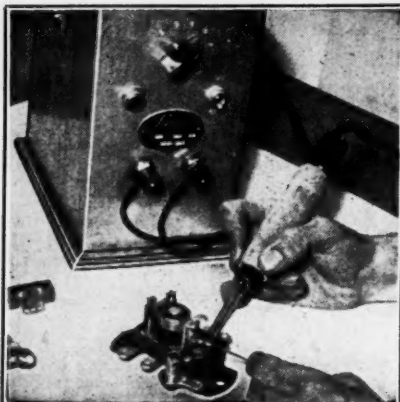


Illustration showing Mead rotary work feeder applied to a hand miller to save time in slotting brass plugs



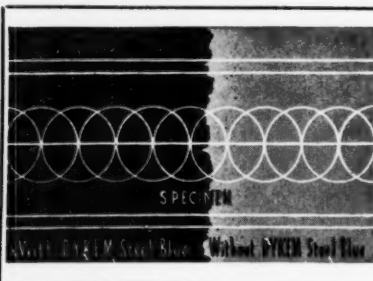
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of feeding brass plugs to the mill for slotting. The operator's left hand works the mill table lever, while his right hand places the brass plugs on the rotary table.

The sequence is as follows: (1) milling machine starts forward, and air line to rotary work feeder automatically opens; (2) rotary work feeder indexes to next station; (3) simultaneously, auxiliary valve on work feeder admits air to H-1 midjet air clamp at work station, which locks the work-piece in its nest just before it passes under the cutter; (4) when mill table



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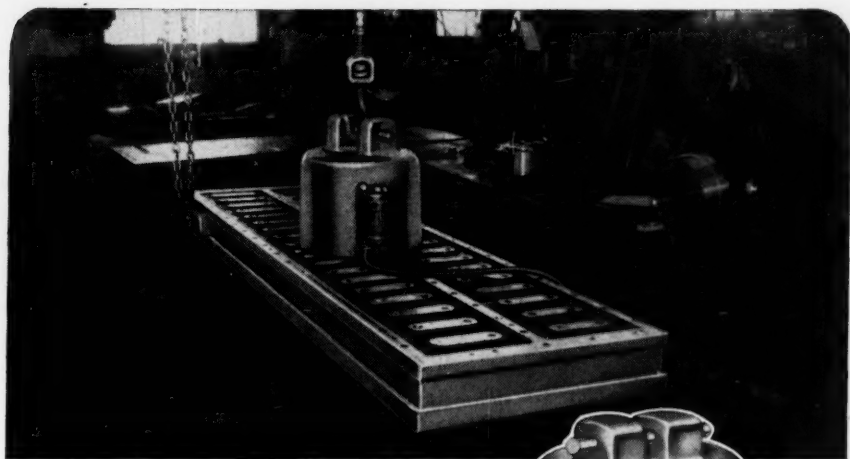
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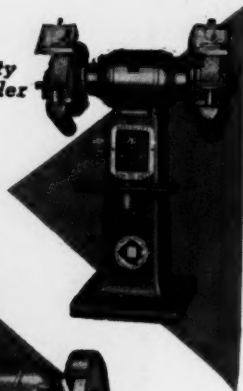
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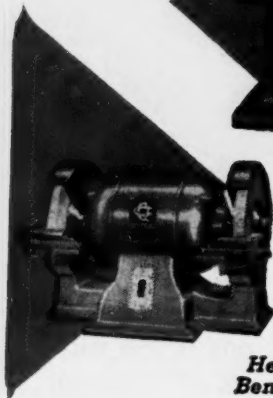
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returns to starting point, it trips FC-2 limit valve that shuts off air from rotary work feeder, which is then ready for the next cycle; and (5) cam mounted on stationary hub of work feeder ejects the finished pieces as they pass.

Made by Mead Specialties Co., Dept M-42, 4114 N. Knox Ave., Chicago 41, Ill., the compact design and low silhouette of the rotary work feeder make it particularly well adapted to this type of operation.

Directory of Independent Tool and Die Manufacturers. Published by Office of Small Business, National Production Authority, and available from U. S. Department of Commerce, Division of Printing Service, Distribution Section, Washington 25, D. C. Price, 25 cents.

This directory lists approximately 1,500 producers of special dies, molds, jigs, fixtures, gages, machines, and related services and is intended to facilitate the use of available producers of such equipment and expedite actual production for defense and defense-supporting requirements. It is arranged to show by symbols the types of special tools and related services each manufacturer is prepared to furnish, the location of his plant, and its size in terms of employees. The directory includes all independent manufacturers in this field who supplied the necessary data, regardless of their membership in the National Tool & Die Manufacturers Association. The material for the directory was gathered by the National Tool & Die Manufacturers Association, and the publication was prepared by the Metal Working Equipment Division of N.P.A.

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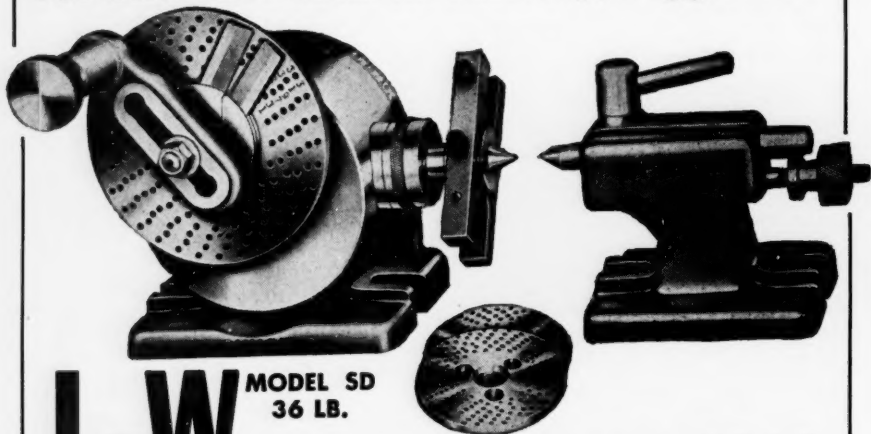
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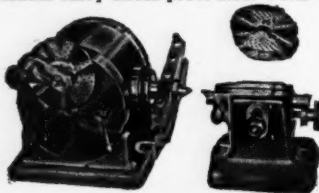
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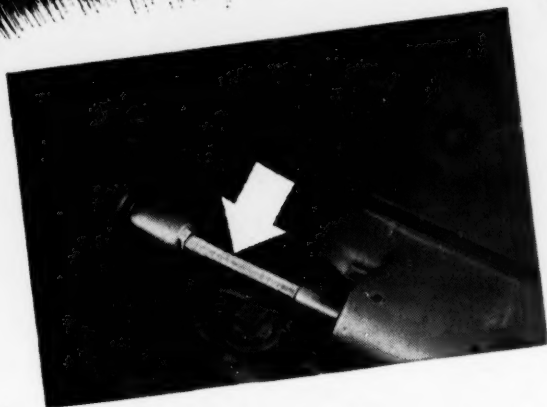
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June, 1953

MODERN MACHINE SHOP 249

news of the industry

Clarkson Engineering (Canada) Limited Forms New American Corporation

Clarkson Engineering (Canada) Limited, manufacturer of "Autolock" and "Dedlock" chucks and a wide range of milling cutters, has announced the establishment of a new sales and service office located at 320 Ontario St., Toledo, Ohio, operating under the name of Clarkson, Incorporated.

The new corporation will maintain a complete stock of the Clarkson products in Toledo in order to provide fast and efficient delivery anywhere in the country. Through the company's years of experience in the manufacture of milling cutters, the Autolock and Dedlock chucks are said to be widely used as parts of milling machines in many industrial plants located throughout Canada.



New sales and service office of Clarkson, Incorporated, Toledo, Ohio

Bullard to Build Office Addition and Toolroom

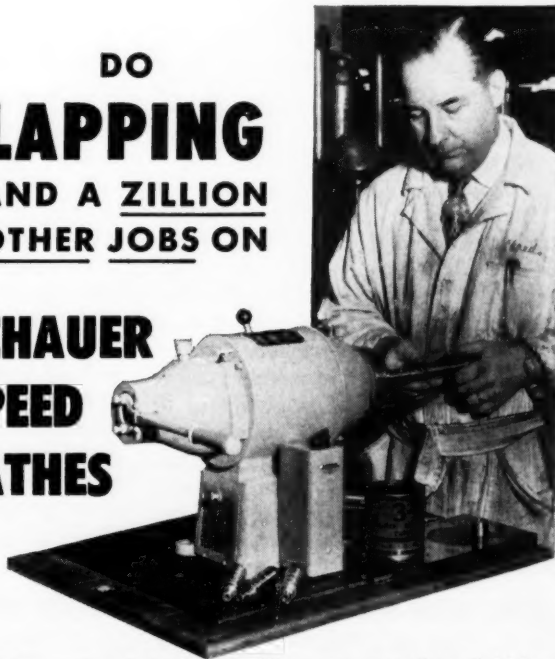
The Bullard Co., Bridgeport, Conn., has announced plans for the building of an office addition and a new toolroom which will cost approximately \$600,000. The office addition, which will be located at the east side of the present office building, will be two stories high and contain 35,000 square feet of office floor space. Construction will consist of reinforced concrete with brick facing to match the present office building. The new building will provide needed space for the engineering and production department, and additional storage space will be provided in the basement of the building. Air conditioning will be used throughout.

The new toolroom will be located on the west side of Black Rock Turnpike, just south of the New Haven Railroad. Of single-story steel construction, the toolroom will measure 222 feet long and approximately 115 feet wide. A 40-foot

wide bay will be provided on each side of the building, running the full length. Offices and locker rooms will be located in the center; the south end will be given over to fabrication, and the north end will be devoted to the assembly of precision tools. Both buildings will be equipped with the latest fire-protection equipment and modern lighting.

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View of Besly-Welles plant showing seven new radial head face grinders being readied for shipment

New Type Grinders Come Off Assembly Line in Quantity

Shown in the accompanying illustration are seven new type Besly-Bowen Radial Head Face Grinders being readied for shipment from the Beloit, Wisconsin, plant of the Besly-Welles Corporation. These grinders feature two rotary work stations and an automatically controlled grinding cycle which permits continuous grinding with a sharp increase in production output and efficiency. Four of these seven machines are individually designed and fixtured to grind parts for automotive power steering equipment.

One grinds the edges of hydraulic pump vanes. Another grinds pump bodies, and a third model equipped with magnetic rotary chucks grinds valve bodies. In this model, each chuck accommodates fifteen castings. The other three grinders are designed to grind automatic transmission parts, such as pressure plates.

In operation, the grinders are started into automatic cycle over one rotary table, leaving the operator free to unload, clean, and reload the alternate table. At the completion of the cycle, the grinding head is indexed over the second table where the grinding cycle

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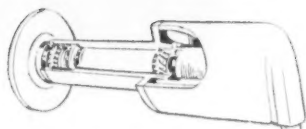
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is repeated. Important features of these grinders include ease of operation and flexibility of application to a broad range of parts and materials

S. C. Rogers & Company Acquired by A. F. Moul

Sole ownership of Samuel C. Rogers & Co., Buffalo, N. Y., has been acquired by Arthur F. Moul. Mr. Moul, who has held approximately a one-

third interest in the company, has purchased the stock interest of the other two owners, Oliver F. Cabana and Lloyd Mansfield. Mr. Cabana has been president and Mr. Mansfield, head of the Lloyd Mansfield advertising agency, has been secretary. Mr. Cabana is also president of Liquid Veneer Corporation. Mr. Moul has been vice president and general manager of the company since 1933.

Mr. Moul will now act as president of the firm, with R. Douglas Campbell as treasurer and Mrs. A. J. Miller, Jr., as secretary.



Arthur F. Moul

The company, started in 1887, has its plant at 183-205 Dutton Avenue and employs about 50 people. The firm is devoted to making machinery for sharpening industrial knives and saws, as well as face grinders for machining operations.

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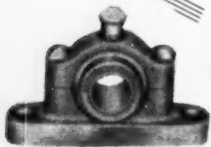
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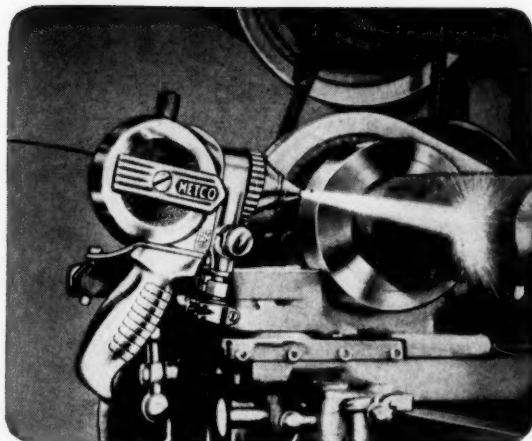


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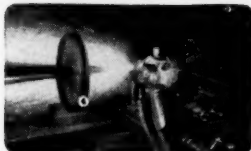
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Sprays 23 Different Metallizing Wires—With the new L-Gun you can spray .10, .25, .80 carbon steels, stainless; babbitts, brass, bronze; nickel, aluminum, tin, zinc; special hard-facing materials such as Metco-Weld H, and the new self-bonding Sprabond wire.

It's Versatile—Use the L-Gun machine-mounted or hand-held—it weighs only 4 lb. 2 oz. Do all kinds of metallizing work—shaft and bore build-up with harder, longer wearing metals; build up worn pump plungers, crankshafts, motor shafts; apply corrosion-resistant coatings. There are hundreds of different jobs that are "naturals" for metallizing.

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sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

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Free Bulletin or Shop Demonstration—Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.



R. J. McWaters,
Metallizing Engineering Co., Inc.
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☐ Please arrange a demonstration in my shop.

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Industrial Equipment Company Changes Name

Paul W. Pearson, president of Industrial Equipment Co., 315 N. Ada St., Chicago 7, Ill., well-known manufacturer of overhead cranes, jib cranes, and monorail systems, has announced that the firm name has been changed to Industrial Crane & Hoist Corporation. The firm name has been changed to better identify the company with

the products it engineers, manufactures, and markets throughout the United States.

Ready Tool Observes 45th Anniversary

Ready Tool Co., 540 Iranistan Ave., Bridgeport, Conn., is celebrating its 45th anniversary as a manufacturer of centers for machine tools. Credited as the "originator"

of the "live" center and responsible for its wide use throughout the United States, the company owns many exclusive patents and original designs as a result of its extensive research and experiments. The company has over 200 models of centers in every size, taper, and type to fit every application. Carl B. Christenson is president of the company and, in this capacity, has been responsible for many of the company's exclusive developments and for solving many of the turning problems confronting machine tool builders and engineers.

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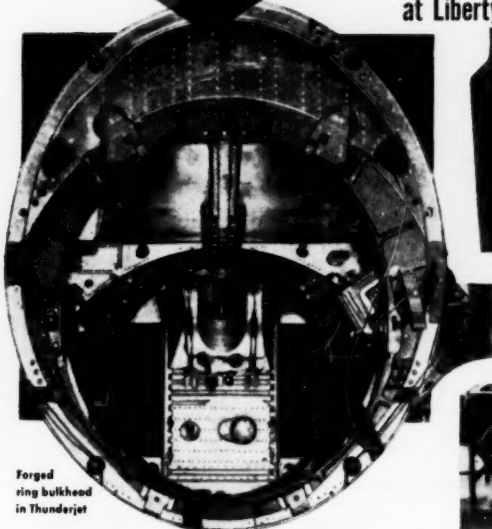
**LOCALITE
fostoria**
for Light ON the Job

Reg. U. S. Pat. Off.

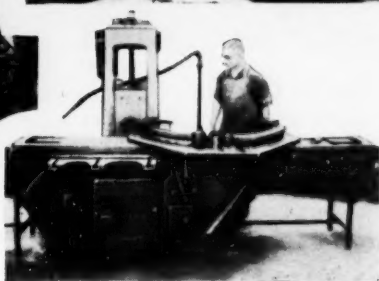
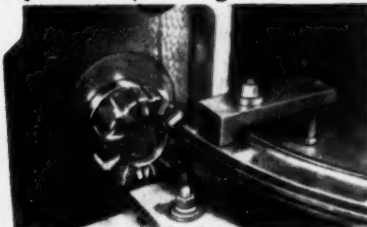
Number One of a Series

OK

carbide cutters mill vital "Thunderjet" Forgings at Liberty Products, Farmingdale



Forged
ring bulkhead
in Thunderjet



REPUBLIC AVIATION'S F-84 Thunderjet doesn't have room in the fuselage to carry the wing spar straight through. Hence, box-section wing spars must be attached to connection points on either side of a forged-steel ring bulkhead. This assembly literally holds plane together, besides mounting the engine.

To get adequate strength in this vital bulkhead, Republic Aviation specifies a chrome-moly steel heat-treated to 180,000 psi and a hardness of Rockwell 40 C (375 Brinell). In milling abutting ends the two half-ring forgings that are spliced to make the bulkhead, Liberty Products Corporation uses OK carbide-tipped cutters exclusively. In fact, this Farmingdale, L.I. plant has standardized on OK cutters for all of its many milling operations.

In the setup shown, a 6-in. dual-adjustable face mill with negative rake and carbide-tipped blades is being used to finish the ends of an I-section ring forging. Two of these forgings are later spliced top and bottom and an accurate fit is required. Two roughing cuts and one finishing cut are taken on

each piece, at a feed rate of 5.5 in. per min. At a spindle speed of 251 rpm, the chip load per tooth figures out at 0.0022 in., which is very good considering the physical properties of the material. Furthermore, 6 pieces are produced per cutter grind.

Like Liberty Products, you too can enjoy the advantages of standardizing on OK cutters. The wedge-shaped blades require no locking devices of any kind and are easily removed when necessary. *Blade slots are machined true*, so that the assembled cutter cuts cleanly without any vibration to produce the smooth finishes so essential in aircraft work and elsewhere. To reduce inventory costs, blades are standardized and interchangeable with other designs of OK cutters. You have a choice of carbide, cast-alloy or high-speed steel blades as you prefer.

See for yourself why experienced shop men, at Liberty Products, in machine tool plants and elsewhere stock and use OK cutters exclusively. Write for new catalog "Modern Milling Cutters for Modern Milling Machines."

OK

modern milling cutters for modern milling machines

The O.K. TOOL COMPANY • Milford, New Hampshire



Gisholt executives reviewing details of new balancing machine line

completed by the Gisholt Machine Co., Madison 10, Wis. In the accompanying illustration, Werner I. Senger, vice president in charge of balancing, is shown reviewing details with

Gisholt Completes Development Work on New Balancer Line
Design and development work on a new and improved line of "Dynetric" Type S Balancing Machines has been

Fred L. Chapman, vice president in charge of sales; George M. Class, vice president in charge of engineering; and Donald L. Timmerman of balancing sales. The company, long a leader in

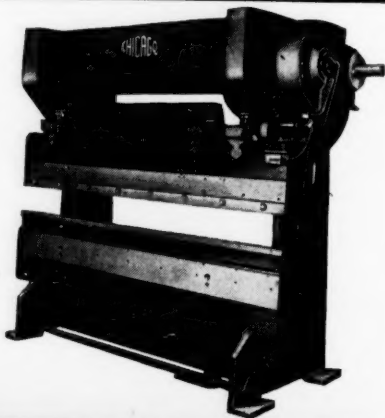


STEEL PRESS BRAKES

43 Standard Sizes

Readily adapted for a wide variety of bending, forming, drawing, notching, blanking, punching, embossing, etc.

DIES Complete Line of Induction Hardened Dies for All Makes and Sizes of PRESS BRAKES.



DREIS & KRUMP
MANUFACTURING COMPANY

7418 S. Loomis Boulevard, Chicago 36, Illinois



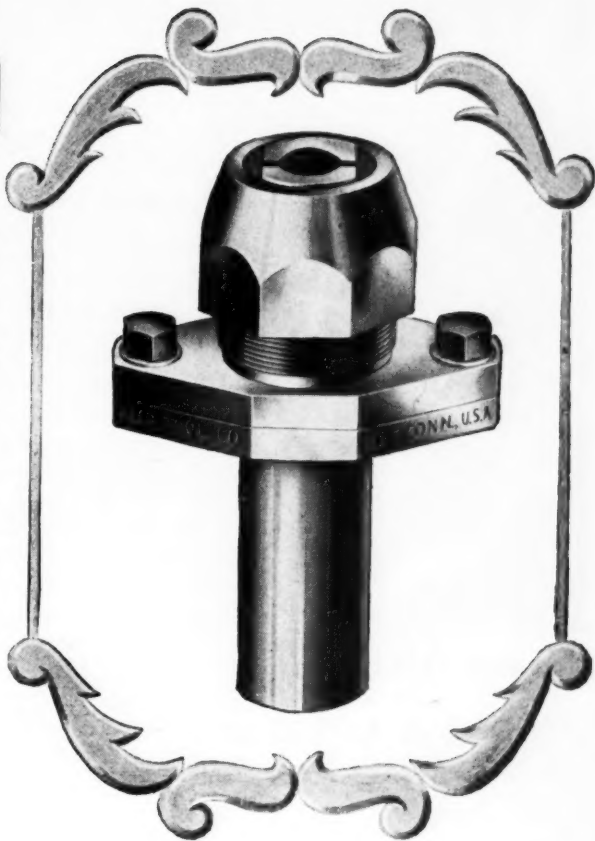
ALCO

Screw machine operators find simplicity and accuracy combined to the highest degree in Alco Tool Holders.

The Alco Drill Chuck shown here will fit all makes of screw machines—old or new, and holds Drills, Reamers, Counter Bore, etc. firmly and securely *without the use of bushings*. This feature alone saves hours of valuable time now wasted in making special bushings, and eliminates entirely the necessity for carrying an inventory of possibly 250 bushing sizes. Saves set-up time, too, because the drill is set directly in the chuck and tightened with the wrench.

All Alco Tool Holders have the patented floating feature which insures absolute concentricity. When setting up for the drilling operation, it is simply necessary to center the drill on the work, tighten two screws on the flange, and the drill remains constantly on center.

Each holder expands to take several drill sizes within its capacity.



ALCO DRILL CHUCK

Remember!

No Bushings Needed

Write for Catalog

ALCO TOOLS
EFFICIENT

THE ALCO TOOL CO.

52 BIRDSEYE STREET

•

BRIDGEPORT, CONN.



**is the ONLY Center
with the
OVERLOAD
INDICATOR**
Look for the RED BAND

You no longer have to guess whether you are overloading your live center thrust bearings if you use MOTOR TOOL LIVE CENTERS. When the load is too great the RED BAND around the spindle disappears into the housing. You can see at a glance when overloading occurs. This is an exclusive feature, developed by Motor Tool which cuts repair costs to practically nothing if due diligence is exercised. As long as the RED BAND is visible you are running COOL and SAFE.

Send for

NEW descriptive folder . . . and verified case histories of how MOTOR TOOL LIVE CENTERS have out-performed and outlasted ALL other centers on exceedingly tough, continuous-run jobs.

MOTOR TOOL MFG.CO.

P.O. BOX 3805, PARK GROVE STATION, DETROIT 5, MICH.

*Make it a Rule
to Call Motor Tool*

the manufacture of balancing equipment, has indicated that the new design incorporates all past-proven features, as well as numerous new features. The new line will include both bench and floor models.

Shear-Speed Acquires New Plant

The acquisition of a new building at 1119 E. Ten Mile Road in the industrial area of Hazel Park, Michigan, to house production facilities of its new Shear-Speed Chemical Products Division, has been announced by Michigan Tool Co., Detroit, Mich. The new building will be utilized primarily for final processing of the line of industrial chemical products to be marketed by the company. Additional warehouse and storage space for finished materials will be acquired as necessary.

Parker Increases Size and Facilities

The erection of a new plant addition and an extensive increase in personnel and equipment has been announced by The Parker Stamp Works, Inc. The newly constructed plant addition represents an increase of 46 per cent in Parker's production area and, although less than 15 per cent of Parker production is defense work, personnel has increased 70 per cent since World War II.

According to Jack T. Bitter, general manager of the Hartford firm, The Parker Stamp Works, since its founding in 1871, has been steadily increasing its facilities to keep pace with the ever-widening requirements of industry. Until recently, the company's business was confined mainly to the New England area. Now Parker marking tools and molds are distributed throughout the nation.

Ames PORTABLE **HARDNESS TESTERS** FOR QUICK, ACCURATE ROCKWELL HARDNESS TESTS



For testing round and flat stock, tubing, saws, knives, etc., up to one inch in Rockwell A, B and C Scales. Weighs only 1½ lbs.



Cast Iron Bench Stand permits use of both hands when testing small parts. Tester is inclined at convenient angle and is firmly clamped in stand.

Box for Tester and Accessories Equipment includes diamond and 1/16" ball penetrators, two anvils, two steel test blocks, one brass test block and Rockwell Conversion Chart.



For testing rounds and flats, dies, odd shaped pieces, etc., up to two inches in Rockwell A, B and C Scales. Weighs 2½ lbs.

Other models for testing up to 6". Send for descriptive literature or ask for demonstration in your plant.



For testing up to four inch capacity in Rockwell Scales. Two inch throat depth. Weighs 3¼ lbs. Model 4-4 has four inch throat depth.

AMES PRECISION MACHINE WORKS
 Makers of Ames Precision Lathes and Bench Millers
 WALTHAM 54, MASSACHUSETTS

R.I.T. Machine Tool Familiarization Program

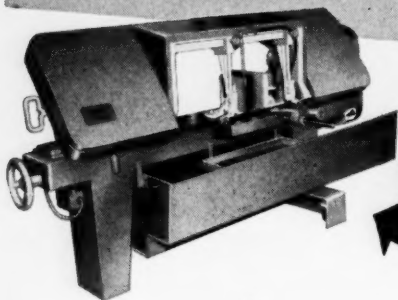
The eighth Machine Tool Familiarization Program for Sales and Service Personnel, offered by the Rochester Institute of Technology, is scheduled to be held June 10-19, 1953, in Rochester, New York. The program is specifically designed to acquaint the sales or service engineer, the manufacturer's agent, or the tool or accessory

salesman with the machine tools, test equipment, and material used by the manufacturer buying his products. The program will utilize the laboratories and other equipment of the Institute. Specifically, the laboratories used for instruction will be the automatic screw machine, the quality control, the metallurgical, and the machine shop. There will also be classroom instruction on such things as machining

characteristics and the metallurgy of brass, steel, aluminum, and various other metals.

The staff will be composed of representatives of machine tool builders and equipment manufacturers, augmented by members of the Institute faculty. Tuition for the course is \$100 payable in advance and includes all course materials. Inquiries concerning the course should be addressed direct to Robert D. Pease, Associate Director, Evening Division, Rochester Institute of Technology, 65 Plymouth Ave., S., Rochester 8, New York.

have you a
**METAL CUTTING
PROBLEM?**



here's
your
solution

Want continuous or intermittent production cutting? Need accuracy of a few thousandths with no burr and minimum kerf? Want to cut bars, rounds, angles and odd shapes at lowest possible cost? Then, get a Kalamazoo Band Saw!

Three sizes are available for cutting 6" to 12" round and from 6" x 10" to 12" x 20" flat. All models can be had with casters for complete portability. Each model has many exclusive features which assure *better cutting at lowest cost*. Write for complete details.

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO CO.

610 HARRISON ST., KALAMAZOO, MICHIGAN

**SPEEDS UP OPERATIONS IN TOOL ROOMS
... ON PRODUCTION LINES**

DREMEL *Electric* **MOTO-TOOLS**



**WRITE
FOR
INDUSTRIAL
CATALOG**

**APPROX.
27,000
R.P.M.**

MOTO-TOOL KIT NO. 2 contains 23 accessories, including *high-speed steel* cutters and Model 2 Moto-Tool in natural finish hardwood case**\$23.50**

MOTO-TOOL NO. 2, with one emery wheel point **\$16.50**

Dremel **HIGH-SPEED STEEL CUTTERS** and balanced wheel points are available for all makes of hand grinding tools. Write for literature.

"The Pocket-Size Machine Shop"

Dremel Moto-Tools are time tested—have been widely used in industry for over fifteen years. A veteran of World War II, Moto-Tool served in war plants and at military maintenance bases throughout the world. Thousands of these mighty mid-gets helped to make the atomic bomb—were used to establish production records in defense industries during the last war. Hundreds of toolroom and production line operations, such as polishing and grinding dies, burring parts, marking tools, sharpening cutters, touch up jobs, etc. are accomplished in seconds, *without tearing down "set-ups."* Moto-Tool is sturdily constructed for long lasting industrial service. Weighs only 13 oz.—dynamically balanced for vibrationless operation.



DREMEL MFG. CO. Dept. 223-F **RACINE, WIS. U.S.A.**



Wash drawing of new plant of Diamond Machine Tool Co., Pico, California

Diamond Machine Builds New Plant

Diamond Machine Tool Co., Pico, Calif., has announced that its new factory and general offices, occupying five acres of ground between Whittier

and Los Angeles, is near completion. The buildings will provide over 55,000 square feet of manufacturing area, exclusive of the general offices, and will house all modern equipment and machinery for the manufacture of a com-

*for greater RIGIDITY
more ACCURATE cuts*



use
CRITERION

CRITERION
machine
WORKS

**BORING
HEADS**

A full line of adjustable boring heads and bars now available. Heads 1 1/2" to 7" dia. Carbide or high speed bars 3/8" to 1 1/4" dia. Lead screws ground AFTER HARDENING. Ample bearing surface, heat treated parts, interchangeable shanks. Criterion tools are the criterion. Write for free catalog and costs.

9312 SANTA MONICA BLVD. • BEVERLY HILLS, CALIF.

This man is running **SIX** *drill presses*

He is performing six consecutive drilling operations with a single jig at a single working station, with less handling time, and without changing tools. He is using the Lign-o-matic turret on a standard drill press.



PUT THE LIGN-O-MATIC TURRET IN YOUR SHOP FOR A FREE 10-DAY TRIAL... IT WILL...

INCREASE PRODUCTION — Many users report more than 300% greater output in actual production. Turret indexes faster than tools can be changed or work moved to another spindle.

CUT COSTS — patented self-centering principle guarantees accuracy equal to drill press spindle. Lign-o-matic

reduces tool and jig wear, cuts worker fatigue: adds up to faster work with fewer rejects. All parts completely guaranteed for TWO YEARS against defective manufacture.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper \$235.00

DELIVERY — Currently, 2 weeks.

TRY IT YOURSELF at our expense. If you are not fully satisfied for any reason, return turret within 10 days and pay nothing.



HOWE & FANT, INC. 540 FLAXHILL ROAD SO. NORWALK, CONN.

- ☐ Please rush Lign-o-matic turrets for (drill press make) (size) (quill dia.) (spindle taper)
- ☐ Please send bulletin with complete information.

MY NAME _____

TITLE _____

(Attach coupon to company letterhead)

plete line of machine tools, including milling machines, punch presses, shears, lathes, horn presses, open back inclinable presses, radial drills, and boring mills.

The main building will consist of three wings which will house the machining, parts, and assembly departments. The wings will be connected to the welding and storage buildings of 10-ton bridge cranes. Established 10

years ago, the company currently has national as well as international distribution.

J. C. Travis Elected President of Handy & Harman

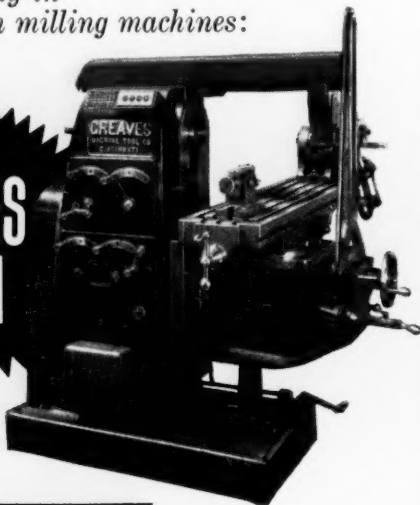
Judson C. Travis has been elected president of Handy & Harman, refiner and fabricator of precious metals and their alloys. During the past year he

served as vice president and general manager, and prior to that he had been executive vice president since 1950. Mr. Travis succeeds G. H. Niemeyer who had asked to be retired from the presidency this year. Active in company affairs for 53 years, Mr. Niemeyer will continue as a member of the board of directors, chairman of the executive committee, and president of Handy & Harman of Canada, Ltd., which is a wholly-owned subsidiary.

All other officers of the company have been reelected; namely, C. W. Handy, chairman of the board; H. W.

*your best buy in
modern milling machines:*

**GREAVES
NO.2-H**



— Plain or Universal

• Offers every modern milling machine advantage:

18 spindle speeds 25 to 1250 rpm,
18 feeds $\frac{1}{2}$ " to 30" per minute, rapid
traverse, Timken bearings and
many others.

You can't buy a better combination
of simplicity, rugged construction,
ease of operation, accuracy and
production speed.

Send for bulletin and price list.

GREAVES

THE GREAVES MACHINE TOOL CO.

2700 Eastern Avenue, Cincinnati 2, Ohio

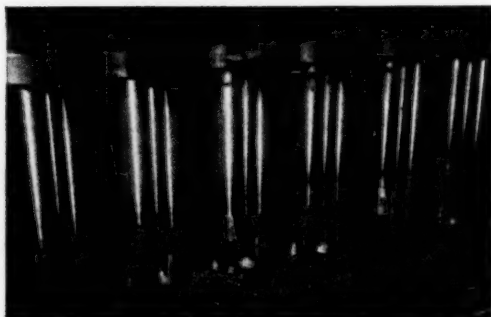
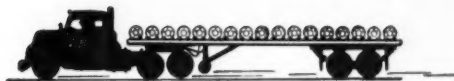
OUNCES
OF



WESSONMETAL

CEMENTED CARBIDE!

TONS OF PRODUCTION!



ACTUAL JOB

Farm Implement Mfg. Co.

Machine.....Ingersoll Boring Mill-6 spindle
Part.....Cylinder block
Operation.....Rough cylinder bore
Tools.....3 R.H. and 3 L.H. Wesson Fine
Pitch Cutters-3.480 dia.-
12 Wessonmetal Solid G1 Blades
Speed.....148 S.F.M.
Stock Removal...3/16"
Feed......10" per min.-.063 per revolution
Length of Cut....8 7/8"

OVER 300% DOLLAR SAVINGS PER TOOL

OLD METHOD

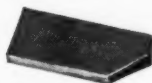
Pieces per Grind.....836
Cost of Tool.....\$49.68
Grinding Cost
per sharpening.....\$11.70
Tool Cost per 100 Pieces...\$2.588

NEW WESSON METHOD

Pieces per Grind.....3160
Cost of Tool.....\$172.80
Grinding Cost
per Sharpening.....\$8.78
Tool Cost per 100 Pieces...\$0.642

On only one machine with Wesson Tools Savings of over \$900 per year

HOW IS YOUR PRODUCTION SCORE CARD!



Write today for folder
on Wesson's
educational, full color,
sound movie—
"This Carbide Age."

WESSONMETAL
Cemented Carbide

WESSON METAL CORPORATION

LEXINGTON, KENTUCKY

Affiliated with WESSON COMPANY, Detroit, Mich.

Boynton, vice president and treasurer; J. W. Colgan, vice president in charge of sales; and F. C. Jones, vice president in charge of production and research. These officers, with the addition of J. C. Travis, G. H. Niemeyer, R. H. Leach, H. E. Radix, and T. H. Gallagher, constitute the board of directors. R. G. Jones was reelected secretary and controller, and F. H. Wemple was renamed assistant secretary.

M.I.T. Summer Metal Cutting Program

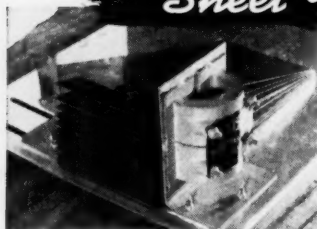
A Special Summer Program in Metal Cutting, designed to enable engineers in industry to more clearly understand the performance of metal-cutting tools, will be given at the Massachusetts Institute of Technology from June 16 to 26 during the 1953 summer session. The following topics will be discussed from a fundamental

point of view: atomic structure and physical properties of metals; mechanics of cutting; plastic flow of metals during cutting; role of cutting fluids in reducing tool friction and wear; machinability and tool life; thermal aspects of cutting; metallurgical aspects of machining; grinding, honing, and polishing; and three-dimensional cutting processes.

Further information and application blanks for the Special Summer Program in Metal Cutting may be readily obtained by simply addressing a letter to the Director of the Summer Session, Room 3-107, Mas-

SPEED UP SHEET STEEL HANDLING *with the* VERNON

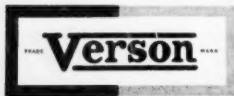
Sheet Floater



- SAVES TIME
- MONEY
- MANPOWER

The Vernon Sheet Floater quickly and economically separates steel sheets and blanks for feeding presses, brakes, shears, etc. It magnetically separates the sheets—causes them to fan out for easy grasping. Feeding is speeded up, danger of cuts and lacerations to workers' hands is reduced, and the possibility of die damage due to feeding more than one piece is minimized. The Sheet Separator can be used for rectangular, round and most odd shaped pieces. It is especially helpful on oily or burred steel that tends to nest when stacked. Two Types in Four Sizes—Write for descriptive bulletin and prices.

A Vernon Press for every job from 60 tons up.



**VERNON ALLSTEEL
PRESS CO.**

9310 S. Kenwood Ave., Chicago 19, Ill.

So. Lamar at Ledbetter Dr., Dallas, Tex.

LOOK FOR THESE FEATURES
IN DRILL JIG BUSHINGS

EX-CELL-O

HAS THEM ALL

- ☒ MATERIAL...premium grade tool steel selected for greatest wear resistance.
 - ☒ FINISH...precision ground inside and out, and under the head for perfect bearing.
 - ☒ CONCENTRICITY...assured by grinding on arbors after the holes are finished.
 - ☒ HARDNESS...hardened to 62-64 Rockwell "C" on accurately controlled equipment.
 - ☒ UNIFORMITY...of material, dimensions, finish, and hardness.
 - ☒ PROMPT DELIVERY...from stocks of standard sizes in Detroit, New York, Los Angeles, and Toronto.
 - ☒ REPUTATION...largest bushing users in the country are Ex-Cell-O customers.
- Ask for Bushing Catalog No. 35371.

XLO

EX-CELL-O FOR PRECISION

EX-CELL-O CORPORATION

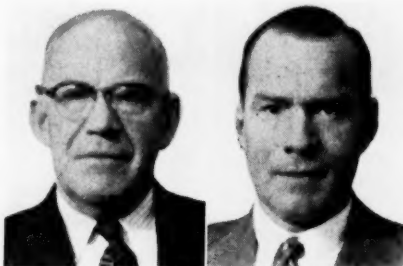
DETROIT 32, MICHIGAN

sachusetts Institute of Technology, Cambridge 39, Massachusetts.

Charles A. Simmons, Sr., Elected Chairman of Simmons Machine Tool's Board

Charles A. Simmons, Sr., founder and president of Simmons Machine Tool Corp., Albany, N. Y., has been elected chairman of the board. Mr. Simmons will be succeeded as president by his son, Charles A. Simmons, Jr., who has been serving as vice president and general manager. Starting as a two-man shop in 1910, the Simmons firm has grown steadily until today it comprises one of Albany's important industrial operations. Its expanding plants, located on Troy Road in Menands, house one of the world's largest facilities for rebuild-

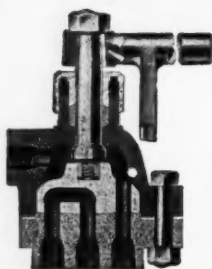
ing machine tools and for manufacturing special machinery. A wholly-owned subsidiary, the Simmons Fastener



(Left) Charles A. Simmons, Sr. (Right) Charles A. Simmons, Jr.

Corporation, started in 1946 and produces special fastening devices for household appliances, aircraft, electrical, and electronics applications.

This Large Processor Chooses Nicholson Valves for LONG WEAR



A large rubber firm reports that Nicholson cylinder control valves recently completed 10 years of constant use, without servicing, on an operation which had proved too much for other tested units. This report further confirms that Nicholson valves, with their specially treated hard seats and non-corrosive lapping flat discs, become tighter with use. For air, gas, oil, steam, water in lever, foot, solenoid and motor types. Press., 300 to 5,000 lbs.

**CAT'G
552**

136 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS



SHARP PERMANENT MARKING WITH HI-DUTY MARKING TOOLS



For legible permanent marking of metal components use engraved lettering tools. Precision engraved dies and inserts for indenting or embossing identification on your parts will



COMPLETE MACHINE FACILITIES TO PRODUCE

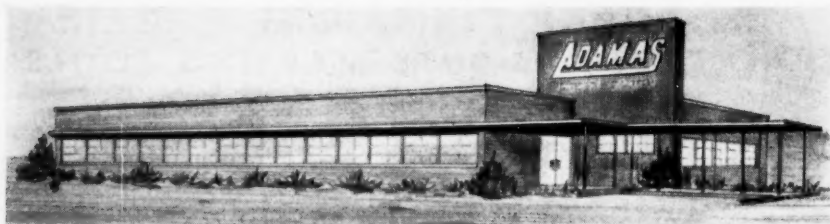
- Hand Stamps
- Engraved Inserts for Dies
- Shank Style Stamping Dies
- Embossing Dies
- Code Stamps
- Steel Type
- Numbering Heads
- Marking Machines
- Nameplate Marking Equipment

1. Improve appearance.
2. Advertise throughout life of part.
3. Facilitate reordering.

Write for free catalog on Production Marking Equipment.

GEO. T. SCHMIDT, INC.

1806 West Belle Plaine Avenue
Chicago 13, Illinois



Wash drawing of new plant of Adamas Carbide Corp., Kenilworth, New Jersey

Construction Underway for New Adamas Plant

Adamas Carbide Corp., Harrison, N. J., has started the erection of a new million dollar plant for the production of tungsten carbide tools, tool tips, dies, wear parts, and powder at Kenilworth, New Jersey. In line with the

company's recent expansion program, the new plant is expected to increase production more than 50 per cent of the present capacity. Representing the third building expansion program for the 10-year-old company, the new plant will be air conditioned and will feature straight-line production.

*Men who had to "lick"
the very problems you're
facing designed...*



ROUSSELLE PRESSES



That's why they're fast, accurate, so adaptable, so easy to operate. Why maintenance is simple. Why initial cost is low . . . Often considerable savings and improved punch press operations are possible if you let our engineering staff assist you. There is no obligation. Simply furnish the details relating to your need or problem and if possible send samples or drawings of the work. You will hear from us promptly.

Sold Exclusively Through
Leading Machinery Dealers

**Rousselle Presses are Manufactured by
SERVICE MACHINE CO.**
7627-29 So. Ashland Ave., Chicago 20, Illinois

Save FABRICATION TIME

with
**STANDARDIZED
DIE SECTIONS**



To substantially reduce your die building time, R-B manufactures standardized composite die sections that are entirely prefabricated and ready for mounting on your die shoes. These R-B die sections eliminate all of your machining, drilling, hardening and grinding.

Series A, B & C die sections have straight tool steel lands, which are hardened and ground; and mild steel bases, which permit drilling of dowel pin holes. Die sections in this series are available in lengths from 6" to 12" inclusive in increments of 1"; and in heights of 1½", 1¾" and 2½".

Also available are series AA, BB and CC die sections having wider lands which permit contouring before hardening. These standardized die sections have the same general construction as series A, B & C illustrated to the left.

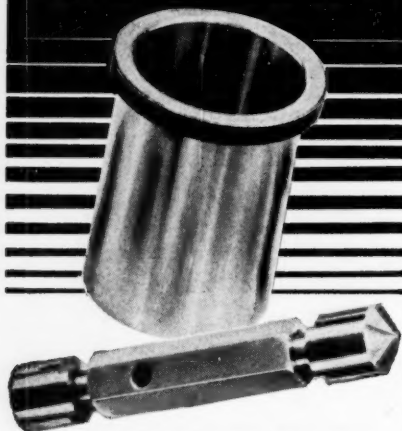
TOOL STANDARDIZATION IS THE BASIS FOR SAVING PRODUCTION TIME. WITH R-B YOU GET THE ACCEPTED STANDARD OF THE SHEET METAL INDUSTRY—IN STANDARD DESIGN FEATURES THAT SAVE IN ENGINEERING, DIE CONSTRUCTION AND OPERATION.



**RICHARD BROTHERS DIVISION
ALLIED PRODUCTS CORPORATION**
DEPT. 71 • 12625 BURT ROAD • DETROIT 23, MICHIGAN

Also Produced in Allied's Four Plants... **HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS • SHEET METAL DIES • ALLITE DIES CAST OF ZINC ALLOY • JIGS • FIXTURES**

FOR ACCURACY IN PRODUCTION



ECONOMY PRECISION BUSHINGS AND GAGES WORK HAND IN HAND



- A.S.A. standard and special drill jig bushings.
- A.G.D. plug and ring gages, both new and chrome plate.
- Gages salvaged by hard chrome plating.

Write for bulletin and price list.

Economy
TOOL & MACHINE CO.

1827 S. 60TH ST., MILWAUKEE 14, WIS.

Carl M. Beach Elected Vice President and Director of Cincinnati Milling & Grinding Machines

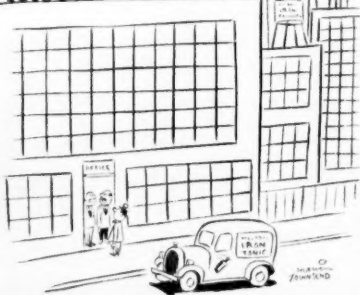
Carl M. Beach, formerly domestic sales manager, has been elected vice president and director of Cincinnati Milling & Grinding Machines, Inc., sales subsidiary of The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. Mr. Beach joined the company in 1929, working as a co-op in the Time Study Department and



Carl M. Beach

Engineering Service for approximately six years. In 1941, Mr. Beach became a sales engineer in the Chicago office until 1944, at which time he was transferred to the Detroit office to serve as office manager. Mr. Beach was appointed assistant sales manager in 1949 and domestic sales manager in 1951.

IRON FOUNDRY



"He wants to make a deal for our by-product."

UNCLE!

Are your machines begging for mercy because of misuse?

Blanchard Grinders, with proper grinding wheels, can and do give high production with extremely close tolerances for dimension and flatness. However, a No. 11 Blanchard user recently received erroneous advice on abrasive wheels from an outside source. The result was that 35 high-speed cam plates were ground on both sides in 1½ hours with surface finish of 24 micro-inches.

By referring the problem to Blanchard, it was easily demonstrated that the No. 11, with correct grinding wheel, would give desired results—90 to 100 cam plates per hour, with surface finish of 4 micro-inches, dimension tolerance of $\pm .0002$, and flat within 2 light bands.

Blanchard wheels are best for Blanchard Grinders — let Blanchard give you the benefit of their vast experience so that you too can get the most from your Blanchard machines.

Information on correct surface grinding procedure and wheel selection are given in "Work Done on the Blanchard" and "The Art of Surface Grinding." Write for free copies today!



"PLEASE CONSULT THE ENGINEERS WHO DESIGNED ME, AND LET THEM SPECIFY THE CORRECT BLANCHARD WHEELS, SO THAT I CAN WORK FOR YOU BETTER, FASTER, AND CHEAPER"



PUT IT ON THE **BLANCHARD**
THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

Metal-Working News in Brief

At a recent meeting of the board of directors, **W. S. Simpson** was elected vice president in charge of the Raybestos Division and **M. A. Thompson** was appointed assistant comptroller of Raybestos-Manhattan, Inc., Passaic, N. J. At the meeting, **J. H. Merrell**, vice president, western sales division, Chicago, was awarded a 50-year service pin by the corporation.

Joseph L. Geenens, formerly superintendent of the Alnico permanent magnet section of Carboly in Schenectady, New York, has been appointed manufacturing superintendent of the Edmore, Michigan, plant of Carboly Department of General Electric Company. In his new position, Mr. Geenens will be responsible for all manufacturing activities at the new plant, including carbide tool fabrication and Alnico permanent magnet production.

— o —

Firth Sterling Inc., Pittsburgh, Pa., has announced the appointment of **T. G. Barnes** as general sales manager. Mr. Barnes, formerly production manager, is succeeded by **G. A. Wilson**, formerly general superintendent of the Carbide Division.

— o —

Farrel - Birmingham Co., Inc., Ansonia, Conn., has announced the appointment of **Samuel S. Board, Jr.**, as director of research at its Buffalo, New York, plant. Mr. Board has been assistant director of research at the Buffalo plant since 1947.

The Hyprez formula
for the
right finish
faster

HYPREZ

**High Precision
DIAMOND
COMPOUNDS**

Ask For a Free Demonstration,
or Technical Bulletin No. S-653

HYPREZ DIVISION

ENGIS EQUIPMENT COMPANY, 431 SOUTH DEARBORN ST. CHICAGO 5, ILL.

STANDARD CARBIDE TOOLS

by SUPER

CARBIDE END MILLS



CARBIDE TWIST DRILLS



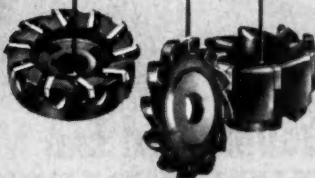
CARBIDE REAMERS



**CARBIDE
SPECIAL TOOLS**



**CARBIDE
MILLING CUTTERS**



**CARBIDE TOOL
BITS**



The Super line of carbide tools features aggressive and up-to-the-minute thinking in cutting tool design. More than 50 items in a complete range of sizes are carried in stock in warehouses conveniently located in New York, Detroit, Chicago and Los Angeles.

Super
TOOL COMPANY

21650 Hoover Road, Detroit 13, Michigan
also 3210 San Fernando Rd., Glendale 3, California

Metal-Working News in Brief

The Bellows Co., Akron, Ohio, has announced the appointment of three field engineers to service territories with the following headquarters: **R. C. Smith**, 1447 Main St., E., Rochester, N. Y.; **Aaron I. Kutz**, 70 E. 45th St., New York 17, N. Y.; and **Robert E. McClure**, 307 United Bldg., 43 Leon St., Boston, Massachusetts.

Clearing Machine Corp., Chicago, Ill., has announced the appointment of **Harry P. Leu, Inc.**, Orlando, Fla., as its representative in Florida and **Shop Supply Co.**, Birmingham, Ala., as its representative in Alabama and Mississippi. Both of these sales distributors will handle the entire Clearing line which consists of mechanical and hydraulic presses ranging in capacity from 30 tons upward.

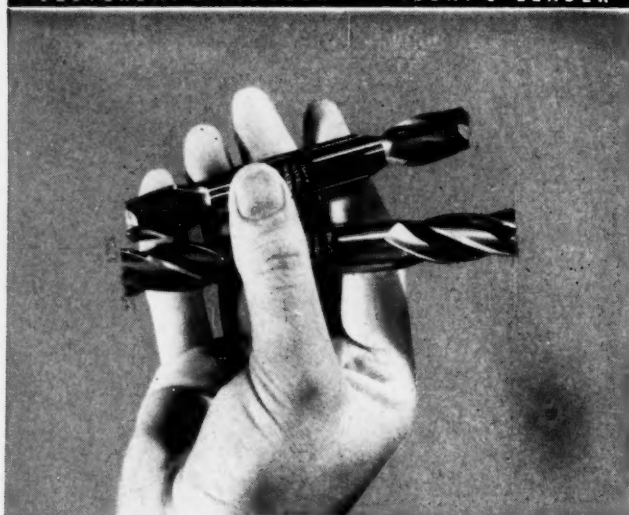
— o —

The appointment of **Albert J. McLaren** as sales manager has been announced by The Cross Co., Detroit, Mich. Mr. McLaren was formerly a sales engineer for the company and has been associated with Cross since 1947.

— o —

Transfer of the headquarters and sales offices of its **Pioneer Pump Division** to 2750 Guardian Bldg., Detroit, Mich., and the transfer of the division's manufacturing operations to a new plant in Paris, Kentucky, has been announced by J. Thomas Smith, president of Detroit Harvester Company.

YESTERDAY'S PIONEER . . . TODAY'S LEADER



WELDON Double-End End Mills FOR DOUBLE DUTY

Weldon Double-End End Mills originally developed by Weldon give you double the service for much less than the cost of two single end mills of equal size. They save production time, too, because to change the

mill you simply turn it end for end. Weldon leadership in the cutting tool field has been achieved by many original features which contribute to faster, better performance and longer tool life.

Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY



3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

Now!

VIKING

TRACER TOOLS

WITH

MECHANICAL

CHIP BREAKER!

- No Chip Breaker Grinding
- Serrated Inserted Carbide Tool Bit
- Reduces Carbide Failure—Saves Diamond Wheels



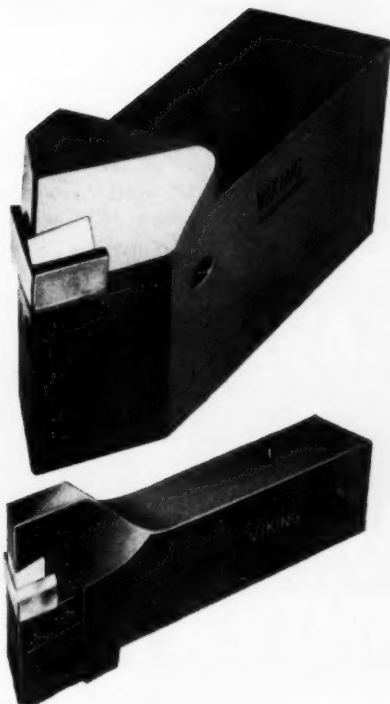
Special designs engineered
to customer specifications



VIKING TOOL CO., INC.

SHELTON, CONN.

INSERTED BLADE SINGLE POINT TOOLS AND MILLING CUTTERS



CHECK THESE ADVANTAGES

1. Separate chip breaker block and tool tip simultaneously locked in tool holder with one locking device.
2. Solid carbide block provides trouble free, long life chip breaker. No chip breaker grooves to grind into the tip each time tool is sharpened.
3. "On the job" adjustment of chip breaker to control the chip to meet variations in speeds, feeds, depth of cuts, and material machined.
4. Carbide to carbide contact of chip breaker block and tool bit allows no wedging of chip under breaker to fracture the carbide.

Write for Free Bulletin

Metal-Working News in Brief

Clearing Machine Corp., Chicago, Ill., has announced the appointment of **Charles J. Linduska** and **Howard W. Carlisle** as assistants to E. J. Cunningham, sales manager of the firm. Mr. Linduska, who has been associated with the company since 1936, will be responsible for the company's pricing

policies. Mr. Carlisle has been associated with Clearing since 1940 and will now work with the firm's field sales organization.

— o —

Harry A. Neff, Ft. Wayne, Ind., has been named a district sales representative for C. A. Norgren Company in the Indiana territory. Mr. Neff will cover the entire state with the excep-

tion of the five northwestern counties. **William H. Nash** has been appointed authorized district sales representative for the company in the State of Michigan. Mr. Nash's headquarters are located at 10300 Grand River Ave., Detroit, Mich.

— o —

Crucible Steel Company of America has announced the appointment of **Richard L. Robertson** as assistant manager of the company's Indianapolis branch and **M. G. Brown** as assistant manager of the Los Angeles branch. Mr. Robertson has been with Crucible for 15 years and Mr. Brown for 17 years.

**SAVE
3
WAYS
WITH A**



CHECK THESE PRICES

Furnace Size	2000'	2300'
6x 6x12"	\$467.00	\$548.00
9x 9x18"	647.50	764.00
12x12x24"	912.00	1068.90
18x18x36"	1419.75	1629.50

Complete with 100% automatic electronic controls.

LUCIFER

ELECTRIC FURNACE

1 SAVE with a Lucifer Electric Furnace on FIRST COST. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces...feature by feature...you'll save money on the Lucifer Electric Furnace EVERY TIME.

2 SAVE ON MAN HOURS with a Lucifer Electric Furnace. Less operator attention needed — Lucifer controls are EXACT. They reach SPECIFIED heat rapidly and retain SPECIFIED temperature without variation. No special experience required when you use a Lucifer Furnace.

3 SAVE on maintenance expense with a Lucifer Electric Furnace. Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed, long lived, trouble free. You save 3 ways with a Lucifer Electric Furnace. More than two thousand satisfied users.

WRITE FOR FREE literature, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering advice without obligation. Write, wire or 'phone today.

GILBERT S. SIMONSKI COMPANY

Route No. 611 Neshaminy 10, Pa. Phone Hatboro 0411
Sole Manufacturers of Lucifer Electric Furnaces

DOUBLE CIRCLE CARBIDE TOOLS

extra service

WRITE FOR
CATALOG
No. 51

*Here are
Facts That Make
Them Outstanding*

CHICAGO-LATROBE has mastered the "trick" of manufacturing carbide tools that are tough and rugged without being brittle . . . giving EXTRA SERVICE to users. This entails more manufacturing "know-how" and exacting care—starting with carbide inserts that meet CHICAGO-LATROBE "close-limits on analysis" specifications . . . followed by backing the carbide insert with ample metal to give strength and support . . . using high speed steel bodies . . . with every manufacturing operation carefully inspected to assure an outstanding tool. Because of this EXTRA SERVICE . . . DOUBLE CIRCLE CARBIDE TOOLS are favored by those who once use them . . . be sure to specify and get "DOUBLE CIRCLE".

CARBIDE INSERT CHECKED TO
"CLOSE LIMITS ON ANALYSIS"
SPECIFICATIONS

AMPLE METAL
BACKS CARBIDE
INSERT

HIGH SPEED
STEEL BODIES

ORDER FROM
YOUR INDUSTRIAL
DISTRIBUTOR



CHICAGO-LATROBE

115 W. UTAH ST. CHICAGO 11

DRILLS • REAMERS • COUNTERSINKS • COUNTERBORES • CARBIDE TOOLS • SPECIAL TOOLS

June, 1953

MODERN MACHINE SHOP 281

Metal-Working News in Brief

Albert G. Lindsay, former manager of Crosley Corporation's Foreign Division, has been named manager of the Export and International Divisions of Rockwell Manufacturing Company and will make his headquarters at the firm's home offices at 400 N. Lexington Ave., Pittsburgh 8, Pa.

Scully-Jones & Co., Chicago, Ill., has announced the appointment of **W. C. Chapman & Sons**, 1817 Maryland Ave., Baltimore, Md., as stocking distributor in Maryland and the District of Columbia; **Dayton Supply & Tool Co.**, 520 E. First St., Dayton 1, Ohio, as stocking distributor for Dayton, Springfield, Piqua, Middletown, Hamilton, Sidney, and Mechanicsburg,

Ohio; and **Shop Supply Co.**, 2412 2nd Ave., N., Birmingham, Ala., as stocking distributor for the entire State of Alabama.

— O —
Bellows Pneumatic Devices of Canada, Ltd., subsidiary of The Bellows Co., Akron, Ohio, has announced the appointment of **Earl G. Berwick**, Toronto; **Manning Otis**, Toronto; **Lorne H. Hay**, Toronto; and **Henry E. Hall**, Montreal, as field engineers for the company in their respective areas. The Canadian firm has offices located at 4972 Dundas St., W., Toronto 18, Ontario and also at 1000 Cremazie St., Montreal, Quebec.

test metal hardness



directly on any size job!

Accuracy guaranteed by individual calibration of each instrument. Direct dial readings... no conversion charts or calculations. Available in Rockwell "A", "B", "C", "15N", and Brinell scales. Test any size, shape, type metal, on-the-job!

WRITE FOR BOOKLET ET 443
OR DEMONSTRATION
Territories Open!
Distributors Inquire!

portable metal hardness testers

Manufactured in the United States

NEWAGE INTERNATIONAL, INC.
235 EAST 42nd STREET, NEW YORK 17, N. Y.

IN CANADA: NEWAGE (CANADA) LIMITED, 1174 BAY STREET, TORONTO, ONTARIO

To Prove Their Valor Redskin Warriors Used Marking Devices

In the Frontier Days, Indian warriors used painted or decorative marking devices to indicate their prowess and to show how many or what kind of coups they had performed.



CADILLAC 115 HAND MARKING MACHINE



GENERAL PURPOSE FLOOR TYPE HAND MARKING MACHINE

Marks: Flat or Round Parts...Parts of Varying Thickness
Rolling Operation for Marking Requires Minimum Pressure

This machine is ideal for many light marking operations and short run jobs . . . its simple construction permits easy changes from one marking operation to another — thereby reducing down-time. Simple fixtures generally suffice for locating parts to be marked . . . specifications for fixtures can be readily met.

Dangers of distortion and fracture are minimized — pressures reduced to barest minimum because this machine *rolls* the impression into the part.

For full information write for Bulletin L-115



ROLL TYPE HOLDER

Depending on requirements, can be had for either solid or interchangeable type.

MARKING MACHINE AND PUNCH PRESS HOLDERS For Interchangeable Type

Made of alloy tool steel, all are furnished with a replaceable platen—hardened and precision ground.



For full information, write for Bulletin SE-130

CADILLAC STAMP CO.

FACTORY and OFFICES

17319 RYAN ROAD • DETROIT 12, MICH.

Metal-Working News in Brief

Firth Sterling Inc., Pittsburgh 30, Pa., has announced the appointment of **Robert J. Steele** as general superintendent of the Carbide Division and **John D. Knox** as superintendent of the Powdered Metals Division. Mr. Steele has been with Firth Sterling since 1934, and Mr. Knox since 1940.

M. M. Schratz, controller of Aluminum Company of America since 1947, has been elected to a newly-created vice presidency. Mr. Schratz has been associated with the company for more than 43 years.

— o —

Homestrand, Inc., Larchmont, N. Y., distributor of high-grade Swedish measuring tools and instruments, has

announced the appointment of **John G. Fitzpatrick Co.**, Seattle, Wash., as exclusive representative in the states of Washington and Oregon. Located at 1425 Fourth Avenue in Seattle, the John G. Fitzpatrick Company will handle the Homestrand line of Metron height gages, vernier calipers, and Vipp dial indicators.

— o —

John D. Thompson has been elected executive vice president of Henry Disston & Sons, Inc., Philadelphia manufacturer of saws, tools, and alloy steels. Mr. Thompson was formerly vice president of John A. Roebling's Sons Company.

STOP VIBRATION.....

2 WAYS WITH...

LOVEJOY FLEXIBLE COUPLINGS



By use of special cushion materials, Lovejoy Flexible Couplings stop vibration due to misalignment of shafts and vibration inherent in either connected machine. Shock, backlash and surge are also absorbed—instantly and permanently. No shutdowns for changing cushions, which are available for every service . . . 1/6 to 2500 H.P. No lubrication ever needed.



Write for Catalog and Quick-finding Selector Charts

LOVEJOY FLEXIBLE COUPLING CO.

5007 N. Lake St.

Chicago 44, Illinois

Also Mfrs. of Lovejoy Universal Joints and Lovejoy Variable Speed Transmissions

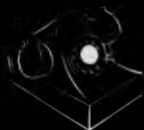


Red Shield says:

**"STANDARD for tough jobs
since 1881"**



as near as your telephone



Call your Industrial Supply Distributor
for Shield Brand Taps. Specialized
factory service available everywhere.

STANDARD TOOL Co.

3950 CHESTER AVENUE CLEVELAND 14, OHIO



NEW YORK • DETROIT • CHICAGO • DALLAS • SAN FRANCISCO

THE STANDARD LINE Twist Drills - Reamers - Taps - Dies - Milling Cutters - End Mills - Hobs - Counterbores - Special Tools

Metal-Working News in Brief

Hypro Tool Company, with headquarters in New Bedford, Mass., has announced a change in its Detroit address to 10428 W. McNichols Rd., Detroit 21, Michigan.

— o —

The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, has announced the appointment of **Sales & Service**

Machinery Co., Suite 201, 3818 Chestnut St., Philadelphia 4, Pa., as sales representative in eastern Pennsylvania, southern New Jersey, Maryland, District of Columbia, and Delaware. The new distributor will offer the complete line of LeBlond lathes and lathe attachments.

— o —

George C. Somes, Jr., former manager of the New York City sales territory for Standard Pressed Steel Co., Jenkintown, Pa., has been named to the newly created position of manager of sales promotion and merchandising for the company. In his new post, Mr. Somes will have complete charge of training courses at the Jenkintown plant and in the field for distributor salesmen and other personnel.

— o —

Reid Brothers Co., Inc., Beverly, Mass., has announced the appointment of **The Lafayette Tool & Supply Co.**, 3355 N. W., 27th Ave., Miami 42, Fla., as distributor for its line of precision surface grinders.

"our 4 'BEAR' DY-NAMIC BALANCING machines turn out 1000 pieces a day... each balanced to our tolerance in less than two minutes!" says Thompson Morrison, Vice-President of Morrison Products, Inc., Cleveland, Ohio. Shown are two of the four "Bear" Dy-Namic Balancing Machines which have been in operation here since 1945.

"We found that Dy-Namic Balancing of cooling fans reduces vibration, lessens bearing wear and noise, and results in greater customer acceptance of our products."

"When blower wheels are balanced STATICALLY only, DY-NAMIC unbalance is often increased... that's why we use the 'Bear' method, which takes care of both static and dy-namic balance in one operation."

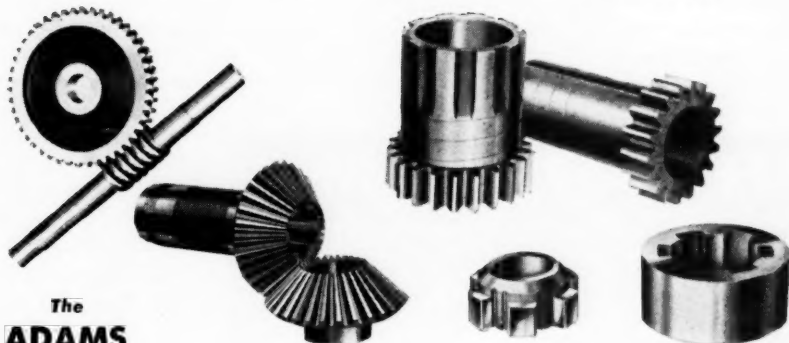
Like hundreds of other industrial plants, Morrison Products Company has discovered that "Bear" Dy-Namic Balancing Machines attain high standards of accuracy at favorable production rates and

with minimum capital investment. Reduce noise, vibration, friction, bearing failure thru Dy-Namic Balancing. **FREE MANUAL** shows how! Write: Bear Mfg. Co., Dept. M25, Rock Island, Ill.

"BEAR"
STATIC AND DY-NAMIC BALANCING MACHINES
balance rotating parts weighing from 4 oz. to 8 tons

GEARS

AS YOU WANT THEM!



**The
ADAMS
Line
Includes:**

SPUR GEARS
HELICAL GEARS
BEVEL AND MITER
GEARS
WORMS AND WORM
GEARS
SPROCKETS
INTERNAL GEARS
(Spur and Helical)
RATCHETS
SPLINED SHAFTS
RACKS
LEAD AND FEED
SCREWS
SHAVED TOOTH
GEARS (Spur and
Helical)
GROUND THREAD
WORMS

Adams Gears are custom made exactly to your specifications. The combination of skilled workmanship, precision equipment, and quality control give you assurance of outstanding quality. This, in turn, assures the dependable performance of your product. The Adams Company, 1942 Cypress Street, Dubuque, Iowa.

The ADAMS Company
Dubuque, Iowa, U. S. A.
ESTABLISHED 1883

FINE GEARS MADE TO
YOUR SPECIFICATIONS



Metal-Working News in Brief

Sales and distribution of the improved Econaway Abrasive Belt Splicer, formerly available from Econaway Manufacturing Company, are now being handled by **Aget-Detroit Co.**, 801 Main St., Ann Arbor, Mich. The splicer can be used for splicing abrasive belts of any length and in widths of up to 14 inches.

The New Britain Machine Co., New Britain, Conn., has announced the election of **Robert T. Frisbie, Jr.**, as vice president. Mr. Frisbie has been sales manager of the company's machine tool division for the past four years.

— o —

The election of **Lysle B. McKinley** as vice president in charge of scientific instrument sales and **Carl A. Day** as

vice president in charge of manufacturing has been announced by **Bausch & Lomb Optical Co.**, Rochester 2, N. Y. Mr. McKinley has been associated with the company since 1929, and Mr. Day has served the company since 1931.

— o —

Howard L. McGregor, Jr., president, **National Twist Drill & Tool Co.**, Rochester, Mich., has announced the election of **Alan R. Devine** as secretary; **John W. Davidson** as treasurer; and **Arthur L. Norton** as comptroller. All three men were also elected members of the board of directors of the company.

FOR GOOD RIDDANCE
OF DUST PARTICLES
• EXHAUST GASES
• FUMES



INSTALL
CMH

FLEXIBLE METAL EXHAUST TUBING...

CMH hose collecting dust particles on a buffer job.

... on air blowers, in suction lines or dust collecting systems. Absorbs vibration ... corrects for misalignment ... can be moved easily. CMH Flexible Metal Exhaust Tubing is made of galvanized steel, brass, aluminum, etc. Standard sizes from 1/2" to 12" I.D. Couplings to suit needs. Write for complete information.



CHICAGO METAL HOSE DIV. FLEXONICS CORPORATION

1373 S. Third Avenue, Maywood, Illinois
Manufacturers of flexible metal hose and conduit,
expansion joints, metallic bellows and assemblies
of these components.

In Canada: **Flexonics Corporation**
of Canada, Ltd., Brampton, Ontario

Jet Engines create chucking problems



The Cushman Chuck Company has engineered and designed an entirely new and tested approach to the problem of holding jet engine discs and rings. These new chucks have been developed in strict accordance with the principles of rapid-production techniques and chucking rigidity *without distortion*.

Designed for both hand and automatic chucking operations. Engineered to your requirements.

THE CUSHMAN CHUCK COMPANY
818 WINDSOR STREET
HARTFORD 2, CONNECTICUT

A WORLD STANDARD FOR PRECISION

Metal-Working News in Brief

Erickson Tool Co., Cleveland, Ohio, has announced the opening of a Mid-Atlantic Division office located at 32 Rittenhouse Place, Ardmore, Pa., **Robert F. Lotz** has been appointed manager of the newly established office and will serve the users of Erickson holding tools in eastern Pennsylvania, Delaware, and Maryland.

Julius Saloway, manager of the Liquidation Division of Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., has been elected to the directorate of the company.

— o —

The appointment of **Paul H. Lahr** as European service engineer for Monarch Machine Tool Co., Sidney, Ohio, has been announced by Stanley A. Brandenburg, sales vice president. Mr.

Lahr will make his headquarters in London, England, covering all of free Europe from this point.

— o —

D. G. Faust, chief engineer of C. A. Norgren Co., Englewood, Colo., manufacturer of pneumatic products, was presented with the Alfred E. Hunt Award at the annual meeting of the American Society of Lubrication Engineers held recently in Boston, Mass. The award was made to Mr. Faust for his technical paper covering the special research techniques and laboratory equipment used in developing the Norgren Micro-Fog Lubricator.

Deburring with NOBUR tool

on drill press reduces
production costs . . . speeds
deliveries!

MEMO

TO: Planning Dept.
FROM: Methods Engineer

NOTE: 75% saving in
time on Op.#4 and
16% in overall time.

Let's take fuller
advantage of
NOBUR

FG. CO.
OUTLINE

OPER NO.	MACHINE	DESCRIPTION	TIME
1	TURRET	BORE & FACE PER PRINT	5 MIN
2	MILL	STRADDLE MILL PER PRINT	3
3	DRILL	10 HOLES LINE DRILL	6
4	BENCH	DE-BURR HOLES	4
4 (REV)	NOBUR	NOBUR HOLES	1
TOOL IN DRILL PRESS			
TOTAL			18 15

For further information, write or wire today

NOBUR MANUFACTURING COMPANY

717 NORTH VICTORY BLVD.

BURBANK, CALIFORNIA

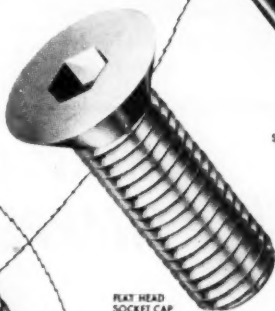
good judgment calls for
PARKER-KALON®
when good design calls for
SOCKET SCREWS



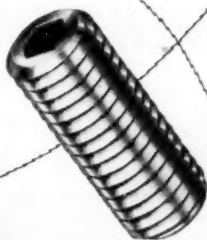
SIZE-MARKED
 SOCKET HEAD
 CAP SCREWS



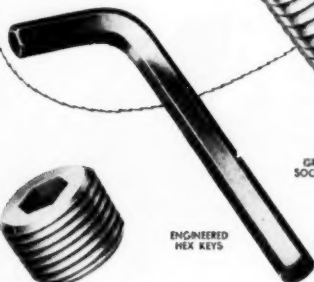
STRIPPER BOLTS



FLAT HEAD
 SOCKET CAP
 SCREWS



GROUND THREAD
 SOCKET SET SCREWS



ENGINEERED
 HEX KEYS



PIPE PLUGS

P-K SOCKET SCREW BULLETIN

16 pages, describes all types, lists sizes, and illustrates quality control back of P-K guarantee. Free on request from your local P-K Distributor. Ask for samples. See why P-K Socket Screws take top honors in any test. Parker-Kalon Corporation, 200 Varick St., New York 14.



Metal-Working News in Brief

Scully-Jones & Co., Chicago, Ill., has announced the appointment of the following stocking distributors: **Cummings & Co.**, 115 E. Lewis St., Wichita, Kansas, to serve the western half of Kansas; **Patrick H. Dillon Co.**, 524 Howard Ave., New Orleans, La., to serve the southern half of Louisiana, as well as Pearl River, Stone, Georgia, Hancock, Harrison, and Jackson Counties in Mississippi; and **Gurley-Ortman Indiana, Inc.**, 1707 E. 52nd St., Indianapolis, Ind., to cover Indianapolis, Evansville, Richmond, Terre Haute, Muncie, and Anderson, Indiana, and Louisville, Kentucky.

— o —

Reltool Corp., Milwaukee, Wis., and the Manufacturers' Industrial Supply Corp., Chicago, Ill., have made a joint announcement of the following ap-

pointments: **The John T. Everett Co.**, Memphis, Tenn., to serve as sales representative for both companies in calling on industrial distributors in Kentucky, West Virginia, Virginia, Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, and Florida; and **The S. D. Bowles Co.**, Dallas, Texas, to represent the firms in Texas, Oklahoma, Arkansas, and Louisiana. Manufacturers' Industrial Supply Corporation acts as a mid-west warehouse for Reltool and other tool manufacturers.

— o —

Barber-Colman Co., Rockford, Ill., has announced the opening of a new factory branch office in Columbia, South Carolina. The new office, located at 537 Harden Street, will handle the sale of automatic control and air distribution products and will be managed by **Robert Lindsay**.

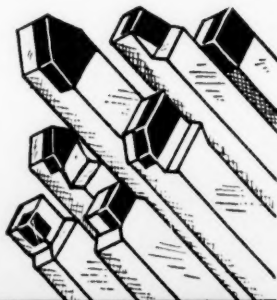


...MAKES DIAMOND WHEELS SHARPEN MORE TOOLS!

STADOIL Diamond Lapping Oil removes load and glaze. It enables you to get on the diamond cutting edges down to the last diamonds. And since no pressure is needed to sharpen, all scratching of tools is eliminated. Diamond wheel manufacturers are unanimous in recommending STADOIL for carbide tool grinding. Excellent as a thinner for diamond lapping compounds to speed lapping. In use for 18 years . . . specified by 6900 plants.

STADOIL is sold in half-pint to 50-gallon containers. If your industrial distributor can't supply, order direct.

For full details, write Dept. 4.



STADOIL MANUFACTURING CO. EL MONTE, CALIF., U.S.A.

INGERSOLL



BLADES: \$117³⁰ **CHIPS: 27 TONS**

Equipped with 34 carbide-tipped blades costing only \$117.30, this 24" diameter Ingersoll Shear Clear Face Mill removes 27 tons of hard die block steel before the blades are used up in resharpeneing.

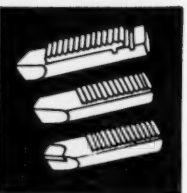
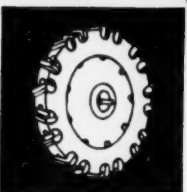
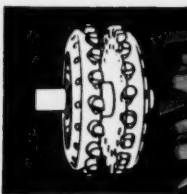
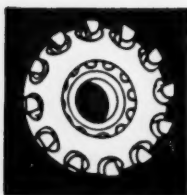
Blades for Ingersoll cutters are of the highest quality, yet they are the most economical for you to buy because they are manufactured with good production equipment.

The low cost of replacement blades is another reason why you should use

INGERSOLL INSERTED BLADE MILLING AND BORING TOOLS

THE INGERSOLL MILLING MACHINE CO.
ROCKFORD, ILLINOIS

**WRITE FOR NEW
INGERSOLL CUTTER
CATALOG No. 60A**



24" dia.

is no problem!

...what's more, Lovejoy is set to give good delivery. Lovejoy's large engineering staff and modern plant offer every facility for production of any size standard or special milling cutter. Our 35 years' experience can help you get the best results, economically, on all milling operations. And, no matter what the age of your Lovejoy housings, blades of H.S.S., alloy and carbide are promptly available from stock!

Write for free catalog.



130 MAIN ST., SPRINGFIELD, VERMONT

LOVEJOY
TOOL COMPANY, INC.

WERNER MILLERS

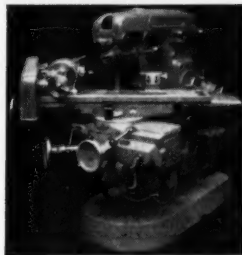
No. 2 Vertical, Universal, Plain

Table sizes: 43" x 12"

Spindle speeds: 80 rpm to 1500 rpm

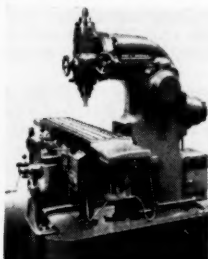
Table feeds: 1/2" per min. to 14" per min.

Horsepower: 7.5 Weight 4800 lbs.



No. 2 UNIVERSAL

No. 3 VERTICAL



No. 3 Vertical, Universal, Plain

Table sizes: 63" x 14 1/4"

Spindle speeds: 28 rpm to 1440 rpm Vert.;

24 rpm to 1200 rpm Plain & Univ.

Table feeds: 1/2" per min. to 23" per min.

Horsepower: 11.5 Weight: 8800 lbs.

No. 4 Vertical, Universal, Plain

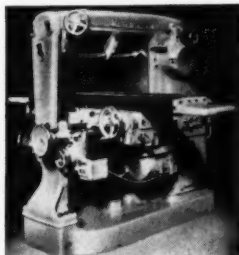
Table sizes: 71" x 16"

Spindle speeds: 28 rpm to 1440 rpm Vert.;

24 rpm to 1200 rpm Plain & Univ.

Table feeds: 1/2" per min. to 23" per min.

Horsepower: 19 Weight: 11,250 lbs.



No. 4 PLAIN



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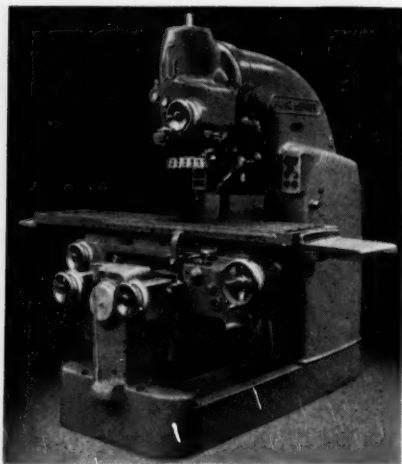
new shop equipment

Vertical Milling Machine Is Designed for Toolroom and Production Operations

The Werner 40-H.P. Knee-Type Vertical Milling Machine which is designed for use as a unique toolroom miller, as well as in mass production plants, has been announced by Marac Machinery Corp., 1819 Broadway, New York 23, N. Y. According to the manufacturer, pre-selectors for feeds and speeds allow push-button selection of any of 42 speeds, ranging from 16 to 1,800 r.p.m., and 50 feeds which range from $\frac{1}{16}$ to 80 inches per minute. Hydraulic cylinders operated by solenoid valves shift the gear

clusters, and limit switches are so arranged that the spindle cannot be restarted until the preselected speed has been correctly engaged. The feed changes take place by electromagnetic clutches, and a new feed can be selected at any time and engaged while the machine is cutting.

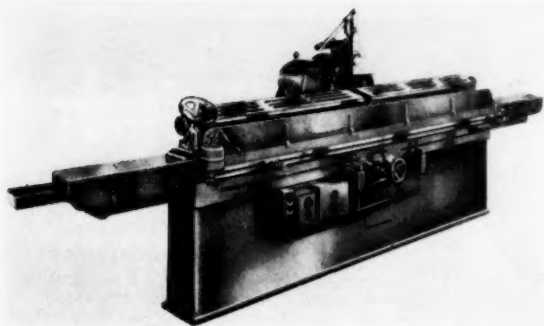
Other features of the machine are an automatic rise-and-fall device; automatic table clamping and unclamping; permanent visual indications of the feeds, speeds, and directions of traverse set into the machine; automatic spindle lubrication; and a built-in climb milling device. The machine is available in two models; namely, the No. 5 which has a table measuring 90 x 19½ inches and a longitudinal traverse of 55 inches, and the No. 6 with a table measuring 110 x 19½ inches. All motors are enclosed and are built for use on 220/440-volt 3-phase 60-cycle current.



Precision Knife Grinder Features Automatic Table Drive Transmission

Designated as the Model "DN," a precision knife grinder which features an automatic table drive transmission and a timing belt drive which is said to be positive, quiet, and non-slipping has been announced by Hanchett Mfg. Co., Big Rapids, Mich. According to the manufacturer, the drive is free from vibration, chatter, and reversal shock. The rack

Werner No. 5 Vertical Milling Machine



Hanchett Model "DN" Precision Knife Grinder

pinion shaft is mounted on roller bearings and the idler shaft is mounted on precision ball bearings to ensure alignment, rigidity, and smooth table operation. The grinder utilizes forced-feed lubrication to the table ways which are both flat and vee, ground to precision tolerances.

The base castings are fabricated, and the machine is available in knife capacities from 32 to 108 inches.

Machine Performs Tracing, Profiling, and Milling Operations

Designated as the Hydro Micro-Tel, a vertical tracing, profiling, and milling machine which is designed for precision operations is now being marketed by De Witt Lewis Co., 3629 Sophia St., Wayne, Mich. The machine has an automatic dynamic support leveling mechanism which is said to level the table and keep it level automatically with the removal of metal. This leveling action, it is claimed, is accomplished through air-hydradyne jacks and a sensitized leveling support. The machine is equipped with automatic gib locking devices which automatically lock the gibs by the air-hydradyne system. A dial must

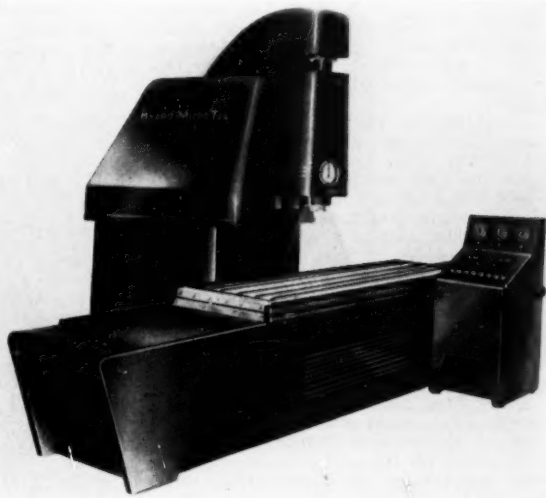
be released before the gibs can be moved. Desired pressure, it is claimed, can be exerted on the gibs, while in motion, to provide close tolerances.

The Hydro Micro-Tel is said to be capable of hydraulic tracing to an accuracy of 0.001 inch and electronic tracing or profiling to an accuracy of 0.0002 inch.

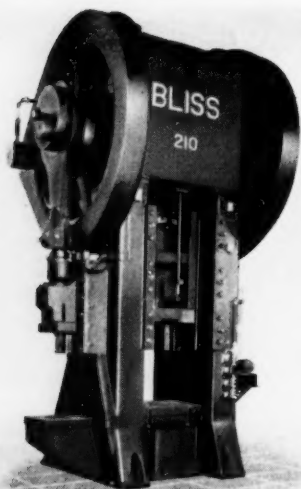
The machine is also said to have spindle selective power feed and depth control to 0.0001 inch.

Trimming Press Features Streamlined Box-Type Crown Construction

Designated as the No. 210, a single-gear trimming press featuring streamlined box-type crown construction and designed for rigidity and quietness of operation has been announced by E. W. Bliss Co., Canton, Ohio. The press has a four-piece welded steel frame and is equipped with twin herringbone driving



Hydro Micro-Tel Vertical Tracing, Profiling, and Milling Machine



Bliss No. 210 Trimming Press

gears running in oil and with rim-type oil-tight gear guards. Additional features of the press are an air counterbalance concealed in the uprights, automatic lubrication, and fast-acting cool-running friction-type clutch. Another important feature is the friction clamp slip-type knockout which is said to prevent accidental breakage of dies, or other parts, by permitting the friction clamp to slide on the knockout bar whenever the bar has not been adjusted to the proper height.

According to the manufacturer, the press operates at a speed of 35 strokes per minute with a ram capacity of 440 tons. The slide has a 16-inch stroke with a motorized adjustment of 6 inches, and the trimming attachment has a 10-inch stroke with a 4-inch adjustment. The press measures 18 feet high, has floor space requirements of 94 x 86 inches, and weighs approximately 98,000 pounds.

Non-Melting Grease Has Unusual Mechanical Stability

Designated as Lubenco Hylo Temp, a non-melting grease which is said to have unusual mechanical stability and which is designed for industrial application has been announced by Lubrication Engineering Co., 470 Frelinghuysen Ave., Newark 5, N. J. The lubricant, it is claimed,

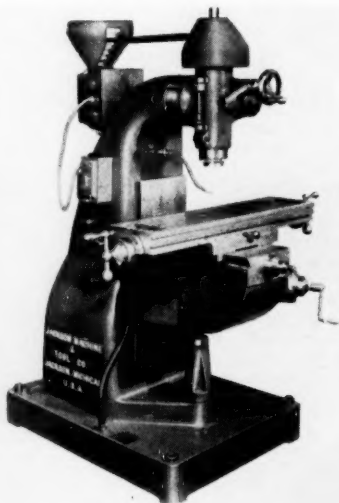
is capable of both sub-zero and extreme high-temperature performance. According to the manufacturer, the grease is pumpable at a minus 20 deg. F. and does not melt or run out of bearings at any temperature. The lubricant is available in 25, 100, and 400-lb. drums.

Vertical Milling Machine Features Heavy Quill Construction

Designated as the No. 2, a vertical milling machine which features a heavy 4¼-inch diameter quill construction and which has a table size of 9 x 36 inches has been announced by Jackson Machine & Tool Co., P. O. Box 193, Jackson, Mich. The maximum distance between the table and the spindle is 14 inches, and the standard spindle has a No. 40 Milling Machine standard taper with an end mill capacity of from ¼ to 2¼ inches. Six spindle speeds ranging from 220 to 2,300 r.p.m. are said to be provided by a V-belt drive.

The machine is equipped with a coolant pump and system, making it ideal for production, as well as toolroom, applications. The machine, it is claimed, has a vertical spindle travel of 4 inches, a table cross-travel of 10 inches, and a longitudinal table travel of 21 inches.

Jackson No. 2 Vertical Milling Machine



High Speed "Controlled Tapping"

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Tap
Holder**

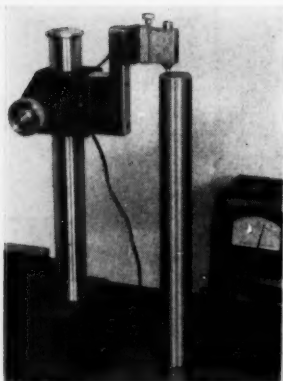
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Dept. 3

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(Left) checking height of long cylindrical part with Par-Ac gage head attached to adapter bracket on saddle in "high" position; (right) checking a sine bar setup with Indi-Ac head on adapter bracket in "low" position.



is attached to the back of the saddle on the stand and carries either the Par-Ac gage head or an Indi-Ac electronic indicator head. A heavy base and column provide rigidity, and the stand is said to be readily positioned on a surface plate.

The adapter bracket, it is claimed, can be attached to the saddle in either of two positions; namely, for holding the gage head to reach extra-high or extra-low surfaces. With the bracket in the "high" position, the gage head contact tip has a vertical adjustment of from $6\frac{1}{2}$ to

17 $\frac{3}{4}$ inches above the surface plate. With the bracket in the "low" position, the adjustment is from 0 to 11 inches. The gage head, it is claimed, can also be mounted upside down for checking bottom surfaces. According to the manufacturer, the adapter bracket normally remains on the saddle and does not affect the use of the Par-Ac as a production gage.

Attachment Adapts Production Gage for Surface Plate Work

Cleveland Instrument Co., 735-C Carnegie Ave., Cleveland 15, Ohio, has added to its Par-Ac line an adapter bracket for adapting its stand-and-anvil type Par-Ac Electronic Production Gage to a wide range of surface plate work. The bracket



PRECISION ANGLE TANGENT TO RADIUS WHEEL DRESSING

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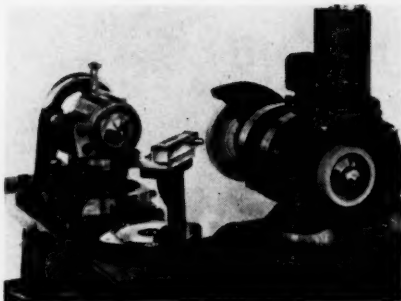
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4250 N. Knox Ave., Chicago 41, Ill.

Wheel Dresser Features Graduated Base

A wheel dresser which features a graduated base and a five-minute vernier to permit precision set up for dressing angles on grinding wheels has been announced by Royal Oak Wheel Tool & Machine Co., 621 E. 4th St., Royal Oak, Mich. The diamond tool is mounted in a hardened steel block, and dressing is accomplished by sliding the block across the hardened ground surface of the dresser plate. The



Royal Oak Wheel Dresser installed on a grinder



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THE COLLIS COMPANY
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Dept. A

dresser plate, it is claimed, can be set to any desired angle, and an inverted T-slide is said to permit dressing the wheel on either side.

According to the manufacturer, the dresser, although designed specifically for use on the D-S bench model radial relief grinder, can also be used on practically all other cutter grinders and tool-room outside-diameter grinders.

Dial Feed Table Has "Positive Lock" Feature

A dial feed table having a "positive lock" feature in which the top plate, it is claimed, cannot over-ride and lose index under severe conditions of operation has been announced by A. K. Allen Co., 57 Meserole Ave., Brooklyn 22, N. Y. An auxiliary air cylinder, built inside the table, is said to bring a set of mechanical members into a toggling position, thus locking the feed pawl to the ratchet. In the indexed position, an anti-backup pawl is said to lock the table against rearward rotary motion. A hydraulic check is of-

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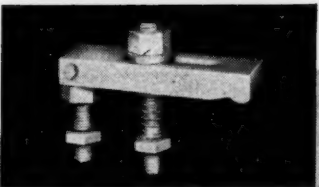
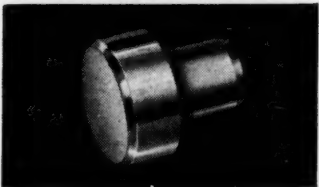
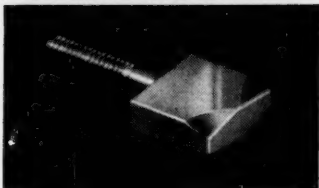
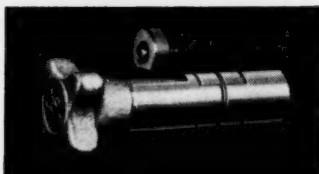
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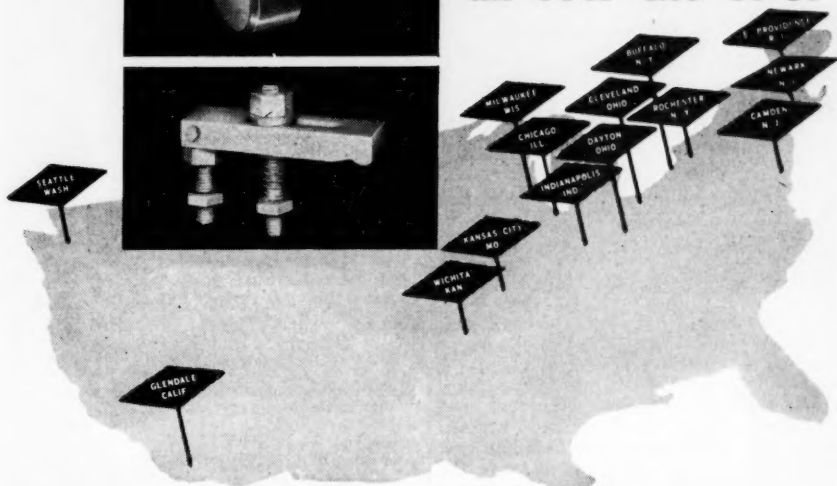
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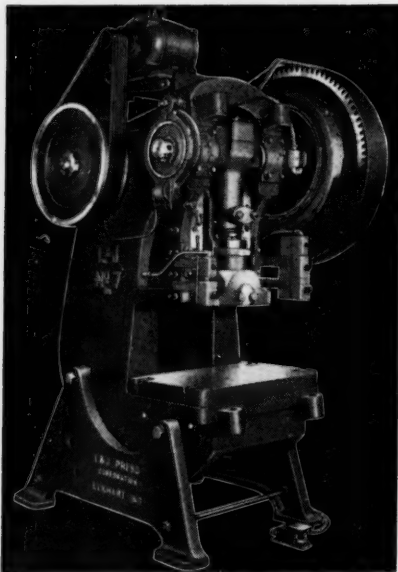
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Fidelity Tool Supply, 309 Vine St.—CAMDEN 2, N. J.
J. R. Reinertson & Co., 24 S. Crawford Ave.—CHICAGO 24, ILL.
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Tool Products Co., 520 Park Ave.—DALLAS 1, TEXAS
H. D. Geisler Co., 2715 Salem Ave.—DAYTON 6, OHIO
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26935 W. 7 Mile Road, Detroit 19, Mich.

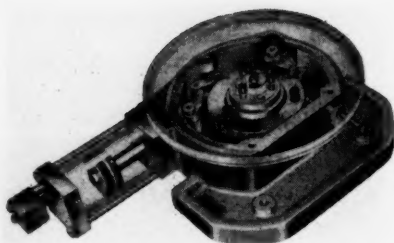
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Allen Dial Feed Table

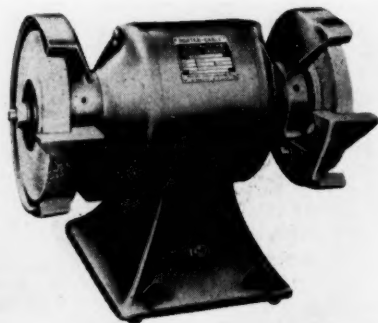
ferred as an accessory and provides a controllable shock-absorbing effect at the end of every index stroke for operations requiring extra-smooth operation.

The table is available in two models; namely, the Model 11FA and the Model 11FB. Both models are available in the standard 4-6-8-12 and 24 set of indexing positions. Accuracy, it is claimed, is to plus or minus 0.002 inch measured at the periphery of the 11-inch top plate. The Model 11FB is identical to the Model 11FA except for the addition of a two-way valve and a pilot timer to make the table operate fully automatically as a self-contained unit.

Bench Grinders Are Available in Various Models

A 1/4-h.p. double-arbor 6-inch bench grinder, designated as the Model 116, which has a capacity for 6 x 3/8-inch grinding wheels with a 1/2-inch bore is one of a series of four models of grinders introduced by Porter-Cable Machine Co.,

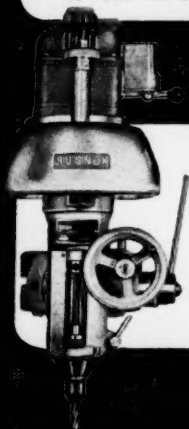
Porter-Cable Double-Arbor Bench Grinder



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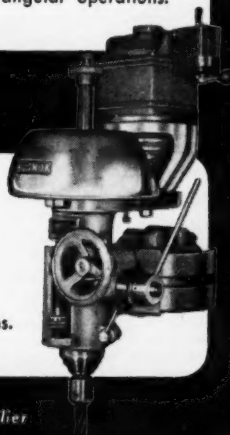


1/2 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
3/4" end mill capacity.
For vertical, horizontal and angular operations.

1 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
3/4" end mill capacity.
For vertical, horizontal and angular operations.



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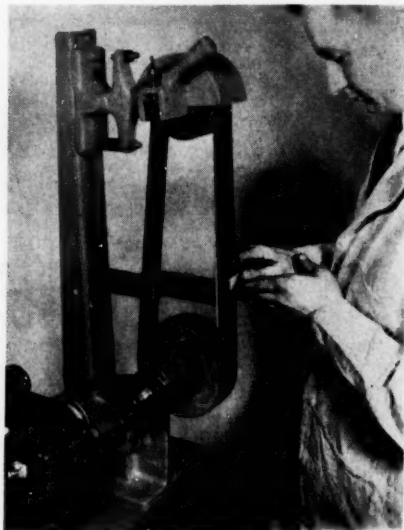


4540 W. BURNHAM ST. • MILWAUKEE 46, WIS.

A 7512-1/3

1363 N. Salina St., Syracuse 88, N. Y. This unit is designed for use in small shops and for intermittent duty in factories.

The Model 517 is a 1/2-h.p. machine which utilizes 7 x 3/4-inch grinding wheels with a 1/2-inch bore. This machine is said to be suitable for large automotive shops, toolrooms, and so on. The Model 518 is a heavy-duty version of the Model 517 and utilizes a 1/2-h.p. motor and 8 x 1-inch wheels with a 3/8-inch bore. The Model 519, the largest grinder in the line, is designed for continuous duty in factories, foundries, and machine and welding shops. This machine has a 1-h.p. motor



Porter-Cable Abrasive-Belt Bench Grinder in use

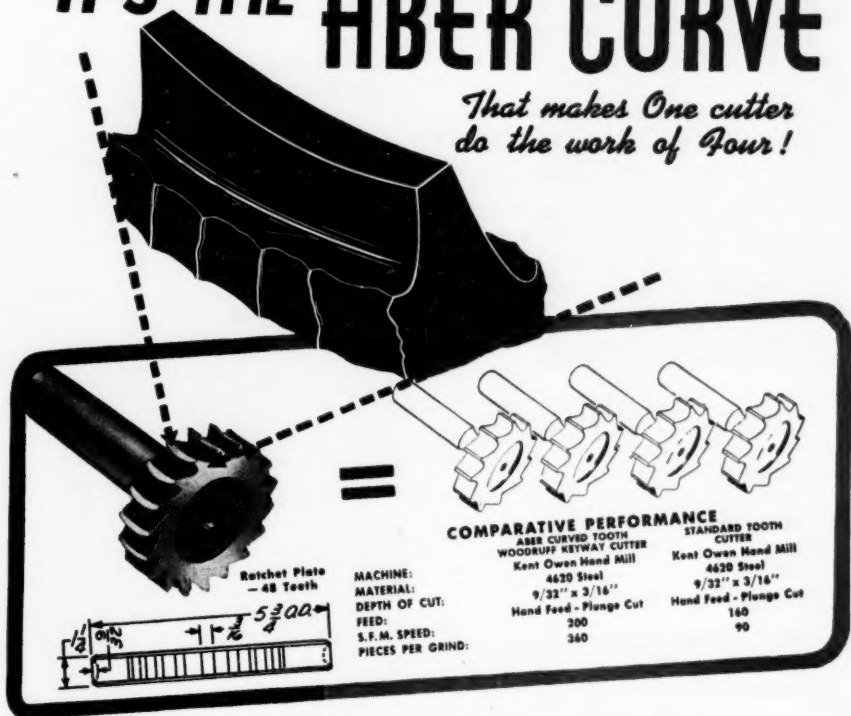
and has a capacity for 10 x 1-inch wheels with a 3/4-inch bore.

The company has also announced two abrasive-belt grinders; namely, the Model CN 2 and the Model BBS. The Model CN 2 is designed for performing contact wheel, flexible belt, platen, and contour grinding and surfacing operations. The machine has a 1/2-h.p. motor and utilizes 2-inch wide endless abrasive belts of any grit. The machine can be used vertically, horizontally, or at any angle.

The Model BBS is a 1-h.p. heavy-duty horizontal bench grinder using abrasive belts measuring 2 1/2 inches wide x 60

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*That makes One cutter
do the work of Four!*



Comparative Performance

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FEED:	9/32" x 3/16"	9/32" x 3/16"
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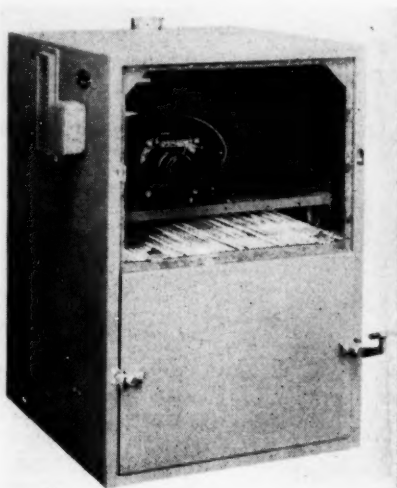
ZAGAR TOOL, Inc., 24000 Lakeland Blvd.

Zagar **TOOLS For INDUSTRY**
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inches long. The belts, it is claimed, can be quickly interchanged for various grits and keep cool by running over resilient-cushioned wheels.

Side Panel Exhaust Vent Now Optional on Some Torit Dust Collectors

The placing of an exhaust outlet in the left side panel, as optional construction, on several of its smaller cabinet-type dust collectors has been announced by Torit Mfg. Co., 296 Walnut St., St. Paul 2, Minn. The purpose of the vent is to pro-



Torit Dust Collector with optional side-panel exhaust vent

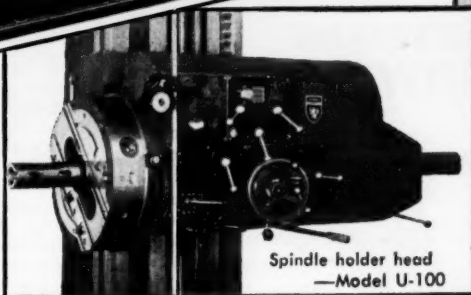
vide efficient recirculation of the cleaned air where the most practical location for the dust collector is beneath a bench or work table. According to the manufacturer, the side-exhaust unit can also be used in many close-quarter locations where clearance over the unit hampers using the regular top-panel exhaust.

The most popular unit equipped with the left-panel outlet is said to be the No. 66 which stands only 33 inches high and fits easily under most workbenches. This unit is powered by a ½-h.p. motor and moves 370 cubic feet of air per minute at an air speed of 7,500 feet per minute. The unit also has a static pressure of 4½ inches.

*Outstanding Value
in Precision Horizontal Boring Mills*



**CENTRALIZED
CONTROL**



HIGH PRECISION in an almost limitless range of operations!

MODEL U-80 — 3-1/8" spindle diameter

MODEL U-100 — 3-15/16" spindle diameter

BUILT TO ASME STANDARDS — STOCK DELIVERY

Ask for illustrated circular giving full details.

MOREY MACHINERY CO., Inc.
NEW MACHINERY DIVISION

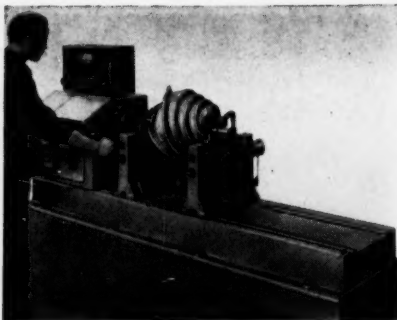
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CAnal 6-7400

EXCLUSIVE AMERICAN REPRESENTATIVE — SALES TERRITORIES OPEN

Machine Quickly and Accurately Determines Unbalance in Rotating Parts

The Schenck Electro-Dynamic Balancing Machine which is said to be capable of accurately determining, in less than a minute in a single run, the amount and location of dynamic and static unbalance in rotating parts is now being marketed by Cosa Corp., 406 Lexington Ave., New York 13, N. Y. The machine is available in nine models having weight capacities ranging from a few ounces to over 100 tons.



Schenck Electro-Dynamic Balancing Machine
in use



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Kaufman specializes in tapping machines—every machine precision-built to meet the requirements of individual production jobs. Designed with fully automatic cycle, single or multiple spindle heads and other most advanced features. Write for complete information.

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RECLINABLE POWER PRESSES



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ZEH & HAHNEMANN CO.

190 VANDERPOOL ST.

NEWARK 5, N. J.

Improved Grinding Spindle Reduces Air Noise

To reduce air noise caused by air discharge in high-speed air-operated spindles, Vulcan Tool Co., Pritz & Highland, Dayton 10, Ohio, has announced that a muffler is now being installed in all new Vulcnaire Jig Grinders and Spindles. Designed for use with this equipment only, the muffler is claimed to eliminate approximately 60 per cent of air noise due to discharge. By dissipating the exhaust energy through hundreds of small

READING BENCH KEYSEATER

Portable—move directly to job; a time saver for both small and large shops.

3 3/4" stroke; adaptable for other work.

Low first cost—prompt delivery.

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CINCINNATI 37, OHIO



It takes only a **Jiffy**
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Whether you ship
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Consider the savings effected in using JIFFY PADDED SHIPPING BAGS.

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SAVE UP TO 76% IN PACKING TIME!

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Available in 8 standard sizes.

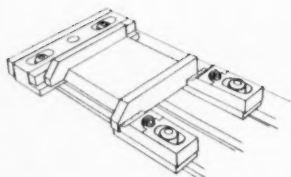
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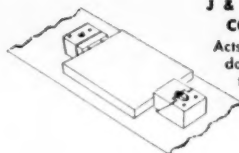


J & S DOUBLE 1/2 VISE WITH MATCHING PARALLELS

- for unquestionable repeated accuracy
- for quicker set-ups
- for stronger grip
- for less obstruction

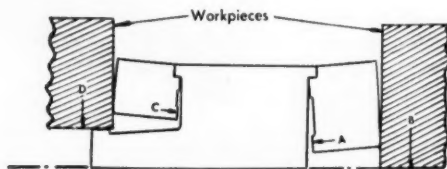
DOUBLE 1/2 VISE IN USE WITH ALL-PURPOSE JAW CLAMPS

for use on jig borers, millers, planers
and shapers.



J & S DOWN-HOLDING COUNTER CLAMPS

Acts on same principle as
double 1/2 vise (left). Fix-
ture clamps operate on
the same principle as
the all purpose jaw
clamps.



Hinged, Spring-Loaded Jaw Gives Positive Down-Holding Action

Hinged lip in-and-down action combined with in-and-down action of clamp holds workpiece against table and absolutely parallel. **Construction is of oil-hardened tool steel, ground and blackened.**

Jig Borers—quickly set up for jig boring accuracy.

Millers—eliminates heavy miller vise and allows milling of more pieces.

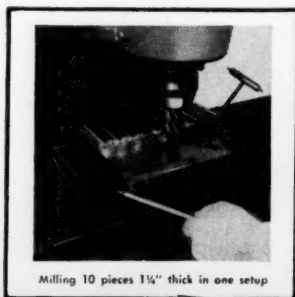
Planers—eliminates strap and finger setups.

Shapers—eliminates vises.

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(N. J. Highway Route No. 10)

Approximately 3 tons pressure closes Gap A, and approximately 1/2-ton closes Gap C—producing a down-holding action on each respective piece of approximately the same force.



Milling 10 pieces 1 1/2" thick in one setup

**J & S
TOOL CO. INC.**

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—obtain complete details on advantages,
applications, types and sizes available.

Booklet describing J & S "Fluidation"
Wheel Dressers, etc., also sent on request.



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phone **Haymarket 1-1200**

The Geo. O. Desautels Co., Indianapolis, Ind.,
phone **Wabash 2403**

L. D. Supply Co., Wichita, Kansas,
phone **5-9692**

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Gale Forssen Co., Springfield, Mass.,
phone **Springfield 9-1011**

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phone **Sterling 6574**

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phone **Kenmore 1-9120**

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phone **MI-4717**

Geo. E. Zweifel & Co., Portland, Oregon,
phone **Beacon 1412**

Gilling Engineering Co., Pittsburgh 33, Pa.,
phone **Allegheny 1-1420**

C. G. Wilson Co., Dallas, Texas

The Lang Co., Inc., Salt Lake City 9, Utah

Ed Schuerer Sales, Milwaukee 13, Wisc.,
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phone **Davenport 4-0700**

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Sam K. Stone, Ft. Smith, Arkansas,
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phone **Underhill 1-2991**

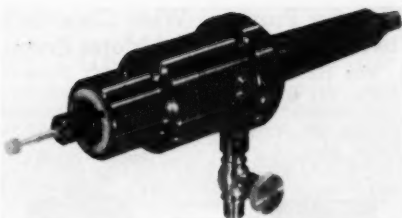
J. H. Ryder Machinery Co., Toronto 5, Ont., Can.,
phone **Princess 6611**

L. C. Thatcher, Seattle, Wash.,
phone **Seneca 4948**

Joseph Monahan Co., Grand Rapids 4, Mich.,
phone **8-3917**

Wright Industrial Supply Co., Toledo 12, Ohio,
phone **Kingswood 5752**

P. M. Company, New York, N. Y.,
phone **Canal 6-7140**



Vulcanair Improved High-Speed Air-Operated Spindle

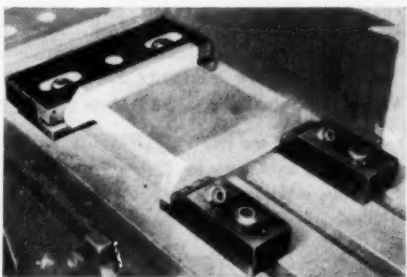
openings, each of which is capable of handling small sections of air, the resulting flow enters the outside atmosphere in a much smoother manner, with 60 per cent of the initial exhaust impact eliminated, it is stated.

Vise Is Designed for Quick and Accurate Setups

A vise designed for quick, accurate setups and rapid loading and unloading of jig borers, millers, planers, and shapers has been announced by J & S Tool Co., Inc., 645 W. Mt. Pleasant Ave., Livingston, N. J. Known as the J & S Double 1/2 Vise, the unit is said to allow loading and unloading by simply loosening one adjusting screw on the opposing clamp. Used in opposition with J & S jaw clamps, the vise utilizes a hinged spring-loaded jaw which secures workpieces rigidly to machine tools. According to the manufacturer, the hinged lip in-and-down action, combined with the in-and-down action of the clamp, holds the workpiece parallel against the table with a force from 1/2 to 3 tons.

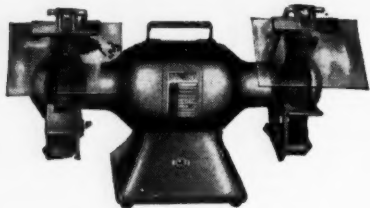
The vise is constructed of oil-hardened tool steel, ground and blackened.

J & S Double 1/2 Vise



Grinder Provides Wide Clearance between Wheels and Motor Frame

The Baldor Electric Co., 4353 Duncan Ave., St. Louis 10, Mo., has announced the development of a grinder, designated as the 600 Series Deluxe which is said to



Baldor 600 Series Deluxe Grinder

provide a wide clearance between the wheels and the motor frame. The grinder is furnished with eyeshields and a carrying handle, and is designed to accommodate 6-inch diameter grinding wheels. It is available in $\frac{1}{4}$ and $\frac{1}{2}$ h.p. ratings.

Improved Cutter Grinder Features Separate Grinding Wheel Spindle Assembly

Mico Instrument Co., 73 Trowbridge St., Cambridge 38, Mass., has announced an improved cutter grinder which features a separate grinding wheel spindle assembly that is said to permit the use of preloaded ball bearings. According to the manufacturer, the separate spindle assembly for the grinding wheel assures a more stable position for the end face of the wheel, as well as relieves the motor bearings of an added variable load. The grinding wheel spindle is belt-driven by a high-speed universal motor suitable for operation on either a.c. or d.c. at 115 volts, and proper belt tension is obtained by an adjustable motor bracket.

The carriage which supports the grinding head slides on totally-enclosed keys and is positioned by means of a micrometer screw that is controlled by a graduated drum mounted at the left of the carriage. The drum has 25 widely-spaced divisions, each representing 0.001 inch of feed. The grinder has a tilting swivel base for the grinding head that is accurately indexed from 0 to 90 degrees. The

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Parts feed automatically toward front—end reaching and fumbling. Bins taper toward front to form convenient semicircle—keep all bins within easy reach. Stacking, locking construction for rigid set-ups, easily changed when necessary. All-welded construction. Smooth, folded edges. New-design, adjustable hoppers provide increased capacity and permit regulated flow of parts according to sizes and weights. Two-sizes—tapered or straight sides.

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Sid Tool
Company

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HIGH SPEED SPECIAL RIGHT HAND TAPS

SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
4	32-48-60-64	7/16	12-16-18-22-24-27-28-30-32-36-40	1-5/8	5 1/2-8-10-12-13-16-18-20-24
5	30-32-36-48-80	1/2	12-14-16-18-22-24-26-27-28-30-32-40	1-11/16	10-12-14-16-18-20-24
6	36-40-48-56-60	9/16	16-20-24-27-28-30-32-40-48	1-3/4	8-10-12-14-16-18-20-24
7	32-40	5/8	12-14-16-20-24-27-28-32-36-40	1-13/16	8-10-12-14-16-18-20
8	24-30-36-38-40-44-48	11/16	11-16-18-20-24-27-28-30-32	1-7/8	8-10-12-14-16-18-20-24
9	24-28-32-40	3/4	9-11-12-14-18-20-24-26-27-28-32	1-15/16	8-10-12-14-16-18-20-24-28
10	28-30-36-40-48-64	13/16	10-14-18-20-32	2	4 1/2-8-10-12-16-18-20
12	20-28-32-36	7/8	10-12-16-18-20-24-27-28-32	2-1/16	12-14
14	20-24-28	15/16	8-9-10-12-14-16-18-20-24-32	2-1/8	12-16-20
1 1/16	60-64	1	10-12-16-18-20-24-27-32-40	2-3/16	12-16
5/64	72	1-1/16	12-14-16-18-20-24	2-1/4	4 1/2-8-12-14-16-18
3/32	48	1-1/8	8-10-14-16-18-20-24-32	2-5/16	12-18
7/64	48-56	1-3/16	8-10-12-14-16-18-20-24	2-3/8	12-16-18
1/8	32-40	1-1/4	8-10-14-16-18-20-24-32	2-1/2	8-10-12
5/32	32-36-40	1-5/16	12-14-16-18-20-24-32	2-9/16	18
9/64	36-40	1-3/8	8-10-14-16-18-20-24	2-5/8	12-16-20
11/64	36	1-7/16	8-10-12-16-18-20-24	2-3/4	16
3/16	20-24-32	1-1/2	8-10-14-16-18-20-24-28	2-7/8	8-12-16
13/64	32	1-9/16	18-20-24	3	8-16
7/32	24-28-32			3-1/4	8-12-16
1/4	18-24-26-27-30-32-36-40			3-1/2	8-12-16
5/16	16-20-22-27-28-32-40			3-7/8	6
3/8	12-16-18-20-27-28-32-36-40-48			4	8-12



HIGH SPEED LEFT HAND TAPS

SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
0	80	3/8	16-24-32	1-3/8	6-8-10-12-16-18-20-24
1	56-64-72	7/16	14-20-28	1-7/16	8-10-12-14-16-18-20
2	56-64	1/2	12-13-20-28	1-1/2	6-8-10-12-16-18-20
3	56	9/16	12-18-20-24	1-9/16	8-10-12-16-18-20
4	32-36-40-48	5/8	11-12-18-20-24	1-5/8	8-10-12-14-16-18-20
5	40-44	11/16	11-16-24	1-11/16	8-10-12-14-16-18-20
6	32-36-40	3/4	10-16-18-20	1-3/4	8-10-12-14-16-18-20
8	32-36-40	13/16	16	1-13/16	8-10-12-14-16-18-20
10	24-30-32-40	7/8	9-12-14-18-20	1-7/8	8-10-12-14-16-18-20
12	24-28-32	1	8-12-14-16-18-20	1-15/16	8-10-12-14-16-18-20
1/4	20-28-32	1-1/8	7-12	2	4 1/2-10-12
5/16	18-20-24-28-32	1-1/4	7-12-16-18		

• **SPECIAL AND LEFT HAND DIES IN STOCK**

Prices on Application—We are always adding new sizes

NOTE: Oversize—Undersize—Metric—64th—and 32nd Size Taps Available for Quick Delivery.

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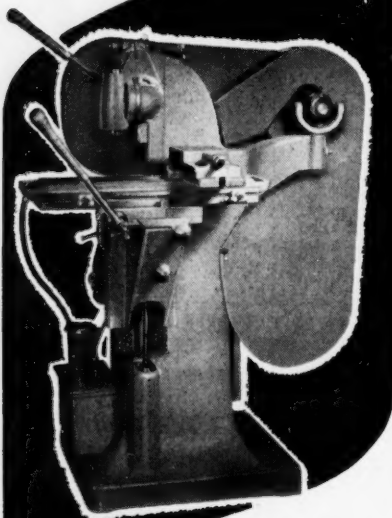
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value. Easily adapted to
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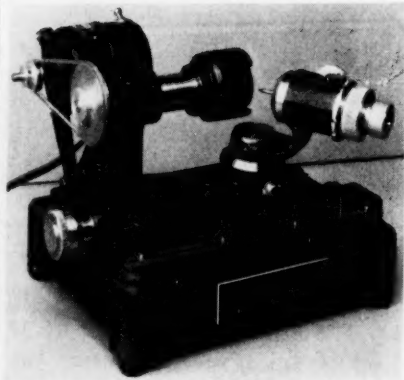


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Suggestions as to how a U. S. No. 1 Milling Machine can cut costs on your particular production needs, as well as complete data on the basic machine and attachments, gladly furnished on request.

THE U. S. - BURKE MACHINE TOOL DIV.

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Cincinnati 27, Ohio



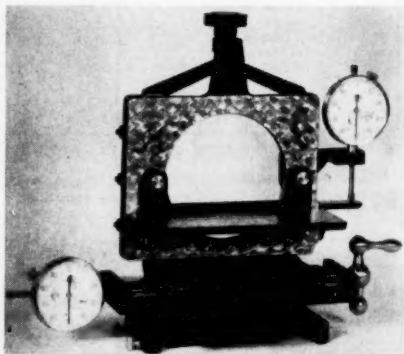
Mico Improved Cutter Grinder

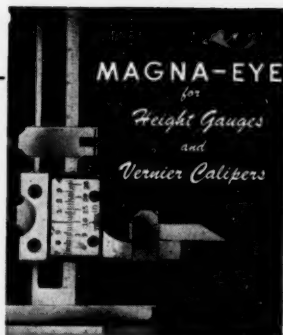
base of the grinder is a heavy iron casting to provide rigidity, and rubber feet support the unit.

Coordinate Measuring Stage

Designed for use on bench optical projectors, a coordinate measuring stage which is said to provide 1-inch longitudinal travel, 1-inch vertical travel, and 1-inch focusing travel has been announced by Portman Instrument Co., Inc., New Rochelle, N. Y. According to the manufacturer, measurements in coordinates can be made with the addition of two 1-inch travel dial indicators. The stage is equipped with an adjustable right-angle platform which can be positioned in three different horizontal planes.

Portman Coordinate Measuring Stage





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for
Height Gauges
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MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. LENS is finest quality optical glass, specially designed and ground for the purpose with utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many others engaged in defense work.

Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. S No. 100 for 6" Vernier Calipers; S No. 200 for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; S No. 300 for most popular type 18" and 24" Height Gages and for 36"-48" and 60" Calipers.

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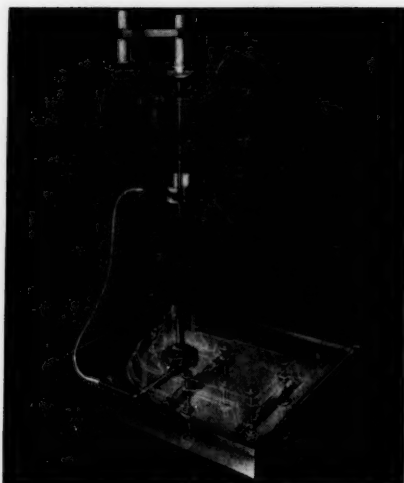
Address _____

MALL TOOL COMPANY

7814 S. Chicago Ave., Chicago 19, Illinois

Coolant Supply Unit Is Designed for Use on Bench Drill Press

Wade & Sons, 974 E. Truman Rd., Independence, Mo., has announced a coolant supply unit which, it is claimed, can be quickly installed into the hollow column of any popular-make bench drill press. According to the manufacturer, no separate motor is required, the unit being driven by the drill press motor. Operating with $\frac{1}{2}$ gallon of any type coolant, the pump carries the liquid through tubing located beneath the drill press. The pan is made of extra-heavy gauge steel and is provided with clips on the sides to hold



Wade Coolant Supply Unit installed on a bench drill press

CAMS

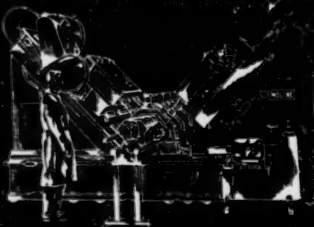
We are fully equipped to **GRIND OR MILL** a complete range of CAMS to your specifications on our **ROWBOTTOM** Cam Milling Machines.

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Boring V-8 Engine Cylinders



DRILLING • BORING
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and Special Machines

splash shields when additional height is desired. The pump intake is screened to keep out drillings that might clog the flow line. The small pan is said to simplify the changing of coolants for different work requirements.

The coolant supply unit is supplied with all fittings necessary to adapt it to all well-known makes of bench drill presses.

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NAMEPLATE MARKING

Model No. 4



The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS.

- Simple Operation
- Perfect Alignment
- Uniform Depth

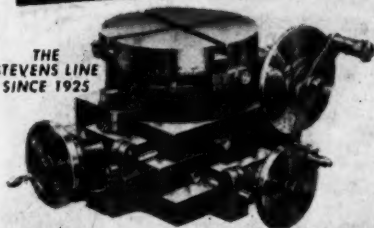
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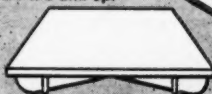
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In 19 sizes, ranging from 4 x 9 x 5 and up.



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Over 50 sizes, ranging from 7 x 7 1/2 to 96 x 192.

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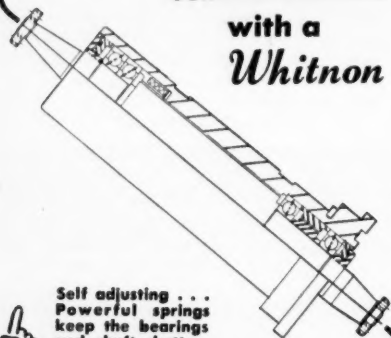
MACHINE PRODUCTS CORPORATION

6771 E. McNichols Rd.

Dept. D

Detroit 12, Mich.

5
Reasons
for replacing the
Spindle on your
#5 BROWN & SHARPE
SURFACE GRINDER
with a
Whitnon

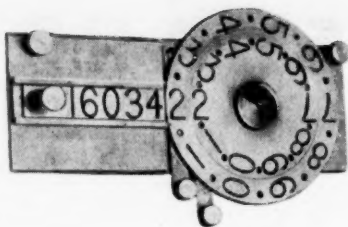


-  Self adjusting . . . Powerful springs keep the bearings and shaft chatter-free regardless of wear or temperature change.
-  Grease lubricated. No oil of any kind required. Bearings and spindle are grease packed and sealed at assembly.
-  Fine finishes are assured . . . The spindle assembly is precision balanced on its own bearings. These ball bearings are the most accurate obtainable.
-  Completely interchangeable . . . This unit replaces the troublesome bronze bearing assembly on your present grinder.
-  Use your original pulley and wheel mount . . . No need to buy special attachments.

Write Today for Price and Delivery

The Whitnon
MANUFACTURING CO.

217 High St. New Britain, Conn.



New Hermes Serial Numbering Dial

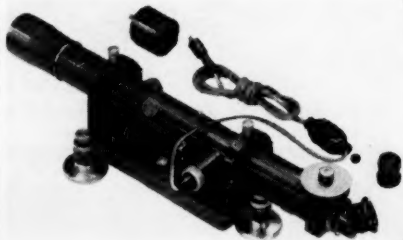
numbering head (Part No. 411-EM151) for use on the Engravograph has been announced by New Hermes, Inc., 13-19 University Place, New York 3, N. Y. According to the manufacturer, the dial can be quickly mounted on the Engravograph and may be operated by unskilled personnel. The attachment consists of a double range of numerals which is said to permit automatic consecutive numeral changes of either the last one or two digits.

Instrument Measures Flatness of Surface Plates

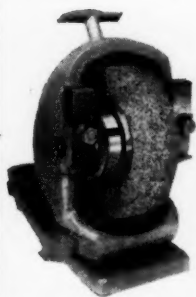
Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill., has announced the improved Microptic Auto-Collimator which is an instrument of the type described in Military Standard 120 for measuring the flatness of surface plates. The instrument is said to be capable of providing accurate readings in any plane—horizontal, vertical, or inclined. With the use of an optical right-angle accessory, the instrument can check in a direction perpendicular to its own axis.

The instrument incorporates an improved filter for sharp, clear readings and an

Improved Microptic Auto-Collimator



Precision WHEEL DRESSING TOOL



Precision Model L 10-89 A Truing Tool using especially designed abrasive wheel offers greatest economy and lasting finish in its method of dressing diamond and grinding wheels. All movable parts are made of special steel hardened and ground. Shaft is mounted with Double Row Ball Bearings having special tolerance for high rate of speed. Enclosed wheel tension mechanism eliminates end play. Easily mounted on any Norton Cylindrical Grinder having C Type Table. Write for details.

tion mechanism eliminates end play. Easily mounted on any Norton Cylindrical Grinder having C Type Table. Write for details.

**THE PRECISION TRUING
TOOL & MFG. CO., INC.**

13 EAST 16TH STREET COVINGTON, KY.



CONTINUOUS HINGES

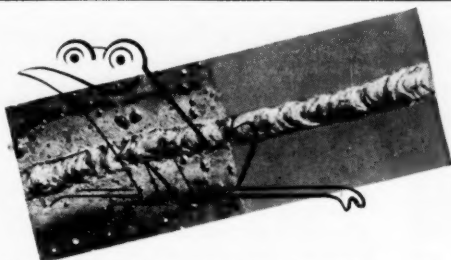
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**AUTO MOULDING
& MFG. CO.**

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CHICAGO 19



WARTS ARE FOR TOADS, NOT WELDS

Spatter is usually a problem in arc welding . . . but these unsightly metal warts get the quick "brush off" with Protect-O-Metal No. 2. Simply brush or spray P.O.M. on weld area and adjacent surfaces. After welding, the troublesome weld spatter wipes off with a cloth or brush.

P.O.M. No. 2 causes no smoke, fumes or odors, is non-flammable and non-toxic. One coat serves for single or multi-pass welds, costs about 1/10¢ per foot, saves up to 85% of weld cleaning cost and labor. Order a trial gallon today. Satisfaction guaranteed.

PROTECT-O-METAL

P O M

G. W. SMITH & SONS, INC.



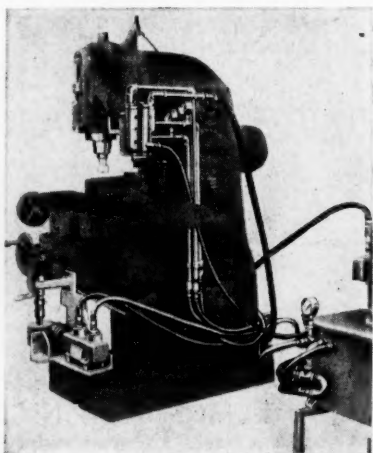
5407 KEMP RD., DAYTON, O.

improved scale which is said to permit the determination of inclinations in two perpendicular planes without rotating the instrument in its bearings. A circular bubble in the base permits quick leveling where necessary, and a precise-lapped leveling pad is also located on the base. An angular eyepiece which rotates through the full circle for convenience of the operator is available as optional equipment. The instrument is supplied with 4-volt illumination, including a 12-foot cord, switch, and plug.



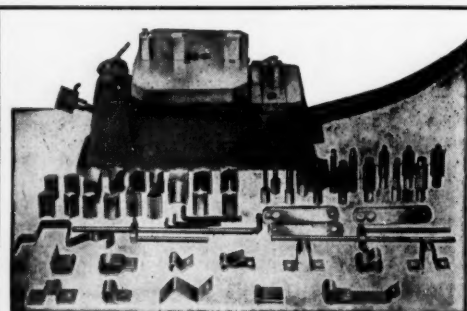
Copying Attachment Is Designed for Use on Milling Machines

Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., has announced



Bondycop Hydraulic Copying Attachment installed on a milling machine

the Bondycop Hydraulic Copying Attachment for use on milling machines when machining complicated parts, such as turbine blades, molded parts, plastic shapes, and so on. According to the manufacturer, the attachment provides for a uniform quality of machined parts, avoids defective pieces, ensures accuracy, and is capable of both large and small runs. The unit, it is claimed, can be easily installed on any standard milling machine.



Multiform

BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds Into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

AIR OR HAND MODELS FOR UP TO 1/2" to 4" MATERIAL

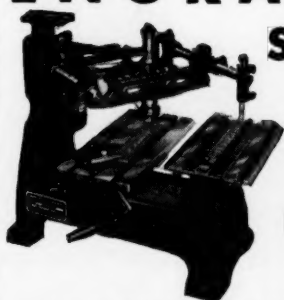
Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6 M

Kalamazoo, Mich.

ENGRAVE STEEL



AND
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including
PLASTICS

with the PREIS-PANTO Model UE-3
HEAVY DUTY BENCH TYPE ENGRAVING
MACHINE.

This is the machine the stamp and die engravers use. It is an exceptionally well built and highly precise machine — easy to use and widely adaptable. Write for FREE Catalog.

H. P. PREIS ENGRAVING MACHINE CO.

657 U.S. ROUTE 22

HILLSIDE, N. J.

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• Pioneers in the riveting field. Head rivets from smallest to 3/4" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 Stillman Ave. Bridgeport 5, Conn.

HIGH SPEED PRODUCTION CONTINUOUS OIL GROOVING

WICACO CONTINUOUS OIL GROOVER cuts grooves of all descriptions, internal or external, continuous or intermittent.

Send us samples for grooving. We will return them cut to specifications, with a record of time and cost estimate. No obligation.

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How You Can Improve Your Production.*

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WAYNE JUNCTION, PHILA. 44, PA.

Manufacturers of

Precision Machinery and Machine Parts

Roller Bearing Twister Spindles—Spindle Oiling Machine

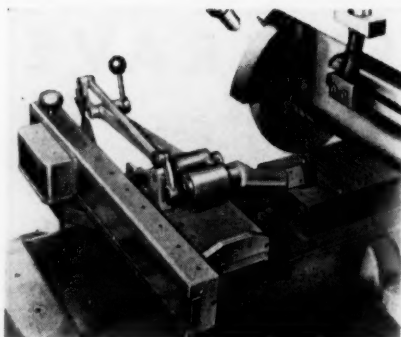
Precision Internal Grinder—Screw Machine Products.



Contour Wheel Dresser Designed for up to 3-inch Wide Wheels

Designated as the KB11-3, a universal contour wheel dresser which, it is claimed, will fit on any horizontal surface grinder and will dress up to 3-inch wide x 20-inch diameter wheels has been announced by Hoglund Engineering & Mfg. Co., Inc., 343 Snyder Ave., Berkeley Heights, N. J. According to the manufacturer, the dresser has an accuracy to 0.0001 inch and is capable of dressing any contour, no matter how complex, that can be entered by the diamond. The dresser is manually operated, the operator keeping the stylus in contact with the template with his left hand and moving the template slide back and forth with his right hand. Diamond movement across the wheel is reduced from the enlarged template through the use of a ratio arm.

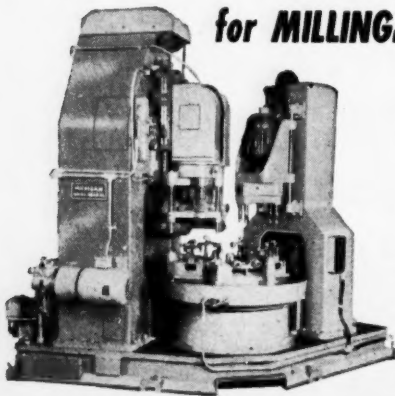
A microscope fixture (standard equipment) is said to eliminate all guesswork in setting the diamonds. The reticle has four concentric rings, 0.005, 0.010, 0.015, and 0.025-inch radius, corresponding to each of the radii of the diamond tools. Other standard equipment includes a



Hoglund KB11-3 Universal Contour Wheel Dresser installed on a horizontal surface grinder

storage cabinet; a microscope diamond setting fixture; three styli; three diamond holders; a roughing diamond; three finishing diamonds with radii and included angle depending upon the work; three Allen wrenches; a stylus clamping screw; and a master setting gage.

This 4-Way SPECIAL MACHINE for MILLING, DRILLING and TAPPING



is one of the special machines we are constantly building, in addition to our line of MULTIPLE DRILL HEADS, to meet the specific requirements of plants, large and small. . . . So, for your DRILLING, REAMING, TAPPING, SPOT FACING, CHAMFERING, COUNTERBORING, NUT DRIVING and BORING operations, use Michigan Multiple Equipment and reduce costs, speed production. WRITE, WIRE or PHONE for literature and details.



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1001 jobs



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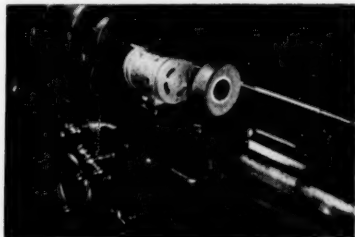
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12 JIG BORERS

Including the largest
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BLOOMFIELD TOOL CORPORATION
37 FARRAND ST. BLOOMFIELD, N. J.



**high speed, portable,
Tool Post Grinders**



Type J-40 with grinding wheel
swung around to right side,
grinding a long shaft to close
tolerance in a 15" lathe.

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East Rutherford, N. J.

EXACT MEASUREMENTS REQUIRE PRECISION TOOLS



Accuracy of measurement depends on the precision of the measuring tools. Provide your shop and inspection department with dependable and proper inspection tools. MEEHANITE METAL TOOLS, made to close tolerances, are furnished in many types.

Surface Plates — Box Parallels
Slotted Angle Plates
Universal Right Angles
Flat Parallels — Lapping Plates
Toolmaker's Knees — "V" Blocks
Straight Edges (Bridge Type)
Straight Edges (Leveling Type)
Measuring Irons
Masterangle Plates
Angle Attachments

Send for Bulletin

ACME TOOL CO.

73 W. Broadway, New York 7, N. Y.

Vernier Caliper Has Both Measuring Scales on the Face

A vernier caliper which features fitted, adjustable vernier plates, both measuring scales on the face, and double-spaced vernier graduations is now being marketed by Homestrand, Inc., Larchmont, N. Y. According to the manufacturer, both inside and outside measurements can be taken and read directly without turning the caliper around. The caliper is made of high-grade hardened tool steel, and the slides are said to be tightly fitted, smooth moving, and open-faced for complete

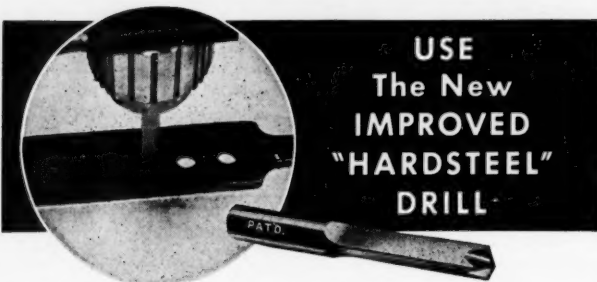


Vernier Caliper

scale visibility. Both scales, it is claimed, are graduated in 0.025-inch increments and have evenly cut lines which are narrow and uniform in width and depth.

The vernier caliper is available in 12, 24, and 36-inch sizes.

Drill Hardened Steels without Annealing —



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon-high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

**You Harden It—We'll Drill It—
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BLACK DRILLING
UNITS—AUTOMATIC,
SELF-CONTAINED—
FOR COST-CUTTING
PRODUCTION ON
ALL MATERIALS**

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Diamond Wheel Lubricant

A lubricant which is said to eliminate the loading and glazing of diamond wheels and laps has been



Stadoil Diamond Lapping Oil

announced by Stadoil Mfg. Co., El Monte 3, Calif. According to the manufacturer, no tool pressure is required while sharpening tools when using the oil, and

MAKE SET-UPS **FASTER--**

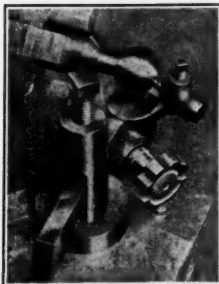
Conserve valuable production time by using the fully universal, easily-operated **MASTER MULTI-SWIVEL VISE** for intricate, angular set-ups in your shop. Three swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional.

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Sizes:
2", 4" and 6".



Monarch Precision SHAPLANE Radius Tools

Illustration shows convex cutter for $\frac{1}{4}$ " to $2\frac{1}{2}$ " balls.

FIVE MODELS for LATHES, SHAPERS, PLANERS, BORING MILLS

Range $\frac{1}{2}$ " to 3" for concave Radii. Also heavy duty models for radii to 6" on planers, etc.

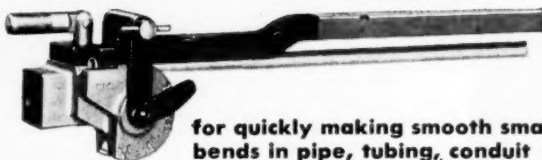
PATENT
PENDING

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C. B. TEETER, TOOL ROOM SPECIALTIES

4470 Oakwald Ave., Chicago 15, Ill.

GREENLEE HAND BENDER

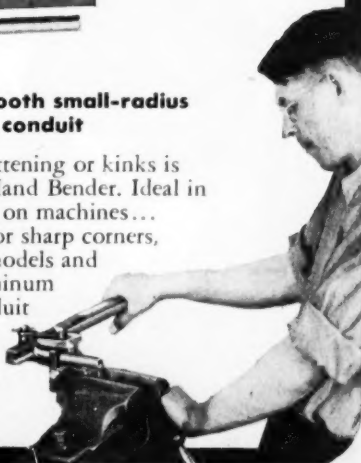


for quickly making smooth small-radius bends in pipe, tubing, conduit

Forming small-radius bends without flattening or kinks is simple, speedy work with a GREENLEE Hand Bender. Ideal in the shop for pipe and tubing installations on machines... especially designed to form neat bends for sharp corners, nooks and other close quarters. Various models and sizes for steel, copper, brass and aluminum tubing or pipe, rigid and thin-wall conduit



GET FREE FOLDER E-207 AND BOOKLET E-201. Complete facts and prices on the Greenlee Bender line. Write Greenlee Tool Company, Inc., Herbert Avenue, Rockford, Illinois.



tool finishes are said to be free from scratches. The lubricant is also said to be ideal for lens generating laps, diamond grinding, wire drawing dies, and as a carrier for diamond dust. The oil is available in $\frac{1}{2}$ -pint to 50-gallon sizes.

Vitrified Bond for Grinding Wheels

Known as "G-Bond" and identified by the symbols "VG" in the marking, a vitrified bond for its grinding wheels has been announced by Norton Co., Worcester 6, Mass. The bond is said to be ideal for precision and semi-precision cylindrical, centerless, surface, internal, gear, tool and cutter, form, and thread grinding operations, as well as for saw gumming. According to the manufacturer, the abrasive grains are held by the bond until they have accomplished their cutting job, and are then released to make room for new grains with fresh, sharp cutting edges.

G-Bond, it is claimed, provides for cool, free, and fast cutting and covers a wide range of jobs. A wheel made of the bond is said to hold its shape, thus making it well-suited for form grinding operations. The manufacturer states that G-Bond can be used in conjunction with many

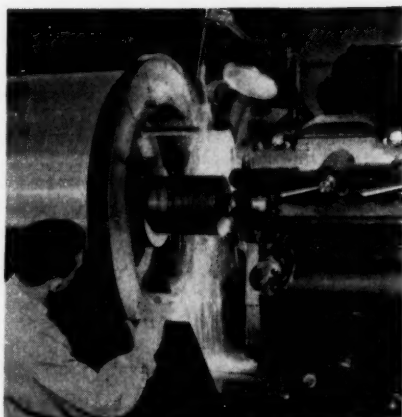
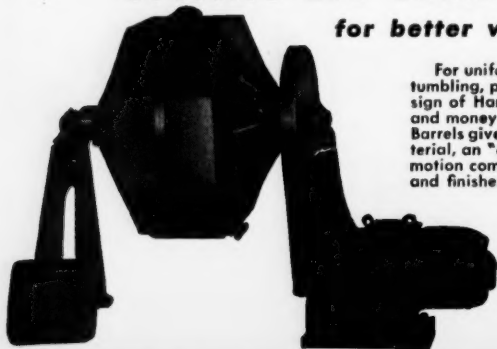


Illustration showing Norton "G-Bond" Wheel installed on a Norton 48 x 96-Inch Type D Roll Grinder for grinding the main body and flange of a bearing sleeve

types of abrasive, including 32 and 38 Alundum abrasive, regular Alundum abrasive, and 19 and 57 Alundum abrasive.

HARTFORD TRIPLE ACTION CUTTING and TUMBLING BARRELS for better work in less time!



For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burrishing balls scientifically correct in design and material for each specific job. Bulletin on request.

THE HARTFORD STEEL BALL CO. HARTFORD 6, CONN.

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\$110.00

Complete
with Pyrometer

\$130.00

Same Model—
All Stainless
Steel

For Heat Treating Small Parts
use a

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MODEL 22 DeLuxe FURNACE
Accurately Controlled

Here's a compact, durable furnace that is ideal for tool and die shops and small laboratories. Any desired temperature within the range of 350° to 1800° F. is controlled by an accurate, built-in Huppert temperature controller. All-steel construction — multi-insulation — sturdy Kanthal elements — counterweighted doors — two removable porcelain trays. Current consumption is 1600 Watts — 110 Volts A.C. I.D. 4½" x 3½" x 9".

OTHER MODELS

		I.D.	Temp. Range	Wattage	PRICE All Steel
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Model No.	5DL	4¾" x 3¾" x 9"	300°-1900° F.	1750	\$172.00
Model No.	9DL	6" x 6" x 6"	300°-1900° F.	2000	\$200.00
Model No.	669DL	6" x 6" x 9"	300°-1900° F.	2500	\$248.00
Model No.	10DL	8" x 4" x 6"	300°-1900° F.	2000	\$215.00

(Also available in stainless steel at slight additional cost.)

K. H. HUPPERT CO.

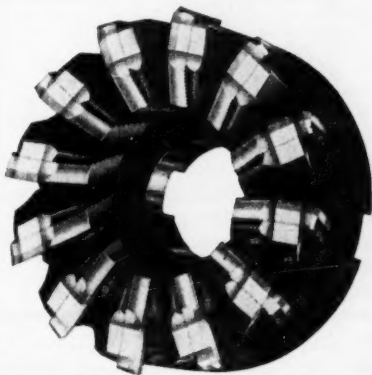
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Manufacturers of Electric Furnaces and Ovens

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METAL-CUTTING **TOOLS**

Here's a "BIG BULL" Cutter
for your
HEAVY DUTY JOBS

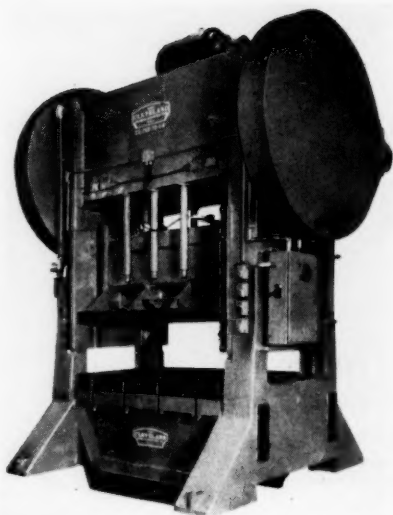
APEX offers many cutters for many jobs. Here's one that takes a big chip fast. It can be had with H.S.S., Stellite, Cobalt or Carbide tipped blades. These blades adjust automatically in two directions. No damage to carbide tips. Diameters from 8" to 24". We also make cutters for lighter work. Write for catalog.



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Double-Crank Press Features Drum-Type Friction Clutch

Product of The Cleveland Punch & Shear Works Co., 3917 St. Clair, Cleveland 14, Ohio, the straight-sided double-crank press illustrated herewith is double-gearred and has a twin drive. Moreover, it is equipped with an electrically-controlled drum-type friction clutch with spring-loaded brake. The slide of the press is counterbalanced by air, and the flywheel is provided with an auxiliary air brake to bring it to a quick stop when the power is shut off. The press, which



Cleveland Straight-Sided Double-Crank Press

has a capacity of 250 tons, features an 8-inch stroke, a 6-inch adjustment, a shut height of 22½ inches, and a bed and slide area of 54 x 72 inches.



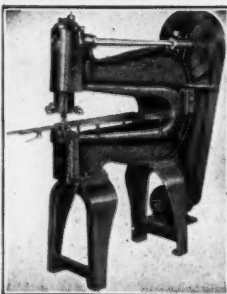
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Hand operated bench punch for punching round, square, flat, or oval holes through ¼" or lighter metal.

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SAVAGE NIBBLING MACHINES



CAPACITIES
UP TO
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ASK FOR
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"NIBBLE YOUR COSTS"

FOR TUBE SLOTTING, TUBE SHAPING
AND CUTTING FLAT SHEETS BY
TEMPLATE OR TO A SCRIBED LINE.

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Knoxville Since 1885 Tennessee

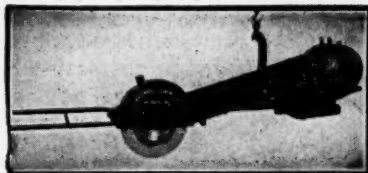
PIONEER MFRS. OF NIBBLING MACHINES

Adjustable Floor Plate Provides An Accurate, Level, Sturdy Surface

An adjustable floor plate which is said to provide an accurate, level, and substantial surface that can be placed directly on the floor without any superstructure and can be leveled with adjusting screws through the top of the plate has been announced by The Challenge

MUMMERT-DIXON SWING FRAME GRINDERS

Sizes 12", 14", 16", 18", 20" and 24" wheels.

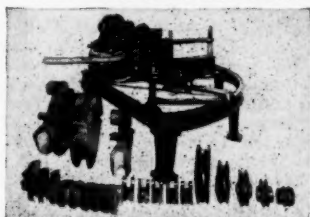


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MUMMERT-DIXON CO.
120 Philadelphia St. Hanover, Pa.

"The
American"

LINE OF COLD PIPE,
CONDUIT AND HEAVY
WALL TUBE BENDERS
HAND AND POWER

ONE OF 10 HAND-OPERATED TYPES
bending cold pipe from 1/4"
to 6" I.P.S. inclusive



MOTOR-POWERED TYPE E AND F
5 and 7 1/2 h.p. — Bend up to
90° without a mandrel. Motor-
Operated capacities 2 1/2" to
6" inclusive.

AMERICAN PIPE BENDING MACHINE CO., INC., 14 Furnace Street, Poultney, Vermont



Up to 2" —
Type A30



COMBINATION BENDING TABLES

For hot or cold bends of various
shapes, pipes, bars, etc. 5' sq.; 7' sq.
(3 1/2' x 7' pairs) suitable for welding
together. Other sizes or custom made
to your specifications.

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Our
PROPOSAL



Exclusive
3-Way
Travel

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PRECISION - PRODUCTION - ECONOMY

Pre-loaded, at a rapid rate by
double row *inexperienced op-*
ball bear- *erators.* Easy set-
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jobs.

MASSIVE, HEAVY HEAD

and table to allow fast cuts
without chatter.

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MODEL

You can easily effect a 50% economy
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this versatile machine.

Designed and built for holding close
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The "BUY"-WORD for small parts
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Second to none.

Priced Under
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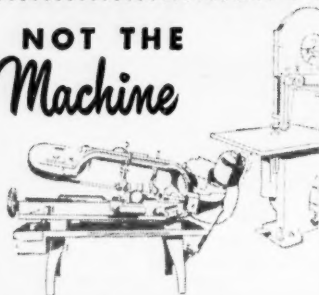
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BARKER ENGINEERING COMPANY

500 GREEN ROAD
CLEVELAND 21, OHIO

IT'S THE
Blade

NOT THE
Machine



THAT DOES THE
Cutting
BE SURE IT'S A
MILFORD

No matter what your investment in band sawing equipment, your choice of Blades governs the results. It's the blade, not the machine, that does the cutting.

That's why it's wise to choose MILFORD and know that you've picked the brand that's unsurpassed for efficient, productive metal cutting. Be it cut-off or contour sawing, even the best designed machine can deliver no more cutting than the blade that is used on it. When you pick MILFORD as the standard for your plant, you've protected your original investment and insured a machine-lifetime of efficient, productive performance.

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SAW BLADE SPECIALISTS

FOR OVER 75 YEARS

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HARD AND POWER HACK SAW BLADES



Buy MILFORD Blades through your local
MILFORD DISTRIBUTOR to make certain
for the ability and economy design to
SERVE YOU BEST FOR ALL YOUR INDUSTRIAL NEEDS



Challenge Adjustable Floor Plate

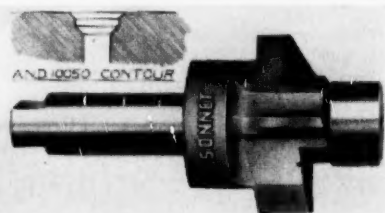
Machinery Co., Grand Haven, Mich. The leveling adjustment is said to be accomplished by means of hardened screws located around the edge of the plate and at each intersection of the ribbing. The adjusting screws are locked in position by locking screws, and the holes are covered by caps. Three special wrenches are provided for making the leveling adjustments.

The floor plate can be furnished as a single unit in sizes up to 54 inches wide x 144 inches long. Larger plates made up of sections interlocked in one complete unit are also available. Each section of the assembly can be used individually or in combination.

Cutter Produces A.N.D. 10050 Port Contour in One Operation

Sonnet Supply Co., 576 N. Prairie Ave., Hawthorne, Calif., has announced the development of a standard carbide-tipped tool to produce, in one operation, the Army and Navy A.N.D. 10050 Port or connecting holes for hydraulic valves, fittings, and so on. The tool has four flutes with each flute performing an operation, thereby producing the form shown in the accompanying illustration. During the cutting cycle, the tool is piloted in the minor thread diameter to ensure concentricity. Both the pilot and shank of the tool are said to be hardened and ground.

Sonnet A.N.D. 10050 Port Contour Cutter



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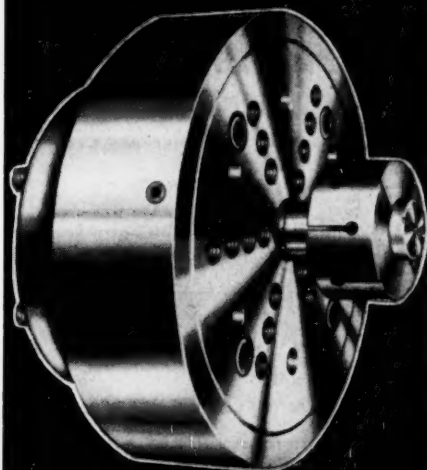
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Light Generator Features 20-Inch Diameter High-Intensity Light Source

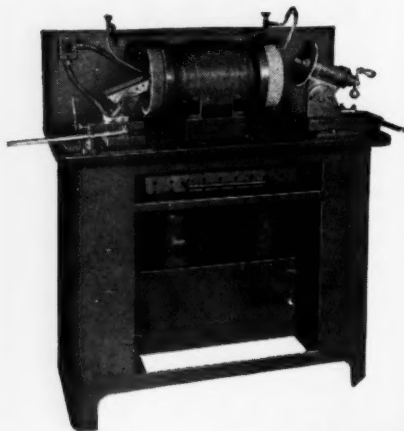
Designated as the "Monolight," a monochromatic light generator which features a 20-inch diameter high-intensity light source for checking large parts or large numbers of small parts is now being marketed by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. According to the manufacturer, the instrument is intended to facilitate the use of large optical flats, up to 10 inches in diameter, and has a 24-inch work height capacity. The work table measures 30 x 30 inches and is completely blanketed by monochromatic light of 20 foot-candles intensity as measured on the working surface. An advantage of the large work area is that groups of parts to be checked with optical flats can be allowed to normalize right at the light source.

The light source, or head, of the instrument can be swung in a 160-degree arc from side to side, thus permitting a considerable area on each side of the table to be blanketed with light. The light-generating element in the unit is mercury vapor.



DoAll "Monolight" Light Generator in use

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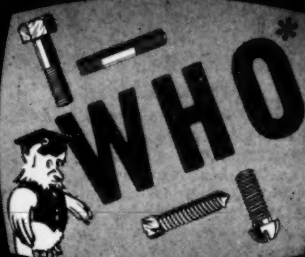
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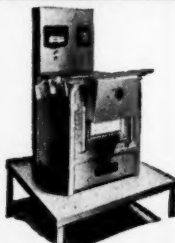
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tube. The instrument is constructed of aluminum, except for the work table which is of cast iron to provide stability.

Comparator Has 10,000 to 1 Magnification

Designated as the Model G, a comparator which has 10,000 to 1 magnification and which features a large gage dial and long-wearing standard gaging plugs has been added to the Air-O-Limit line by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn. Mag-

nification is said to be obtained by the use of an amplifying unit, consisting of an adjustable restriction and large indicating dial. The unit is furnished with either one or two magnifications; namely, 10,000 times (full scale equals 0.0008 inch, each division equals ten millionths) or 5,000 times (full scale equals 0.0016 inch, each division equals twenty millionths).

The large dial, 5 inches in diameter with linear graduations to 180 degrees and arc length to 8 inches, is used for ease in reading. A swivel-mounted and easily-positioned meter is of the high

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parator

plugs have a comparatively large diametrical clearance or nozzle drop. Hand gage attachments, both straight and L-type, are available for gaging operations where greater convenience may be obtained by bringing the gaging plug to the workpiece. Other features of the comparator include a Jacobs chuck plug adapter, adjustable restriction unit, Mullmatic regulator, and stand.

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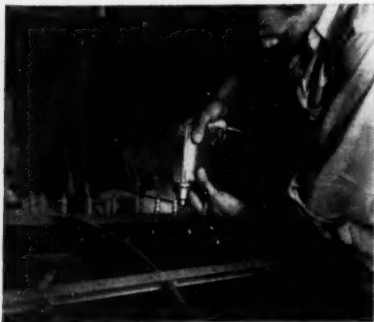
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New Haven 7, Conn.

Portable Drill Is Available in Six Standard Chuck Speeds

Designated as the "Mighty Midget," a 1/4-inch portable-electric drill which is



Stanley "Mighty Midget" 1/4-Inch Portable Electric Drill in use

available in six standard chuck speeds ranging from 5,000 to 600 r.p.m. has been announced by Stanley Electric Tools,

New Britain, Conn. Built for heavy-duty production work, the drill is said to be light and powerful, compact, and easy to handle in close quarters. The drill is equipped with ball bearings and helical gears to provide for long continuous service. The unit incorporates a pistol-grip handle and has a polished die-cast aluminum housing which is said to be dirt and grease-resistant.

The Mighty Midget is furnished with a three-jaw geared chuck with a Rubber-Flex chuck key and has a universal motor which operates on either d.c. or a.c., 60 cycles or less.

Floating Reamer Provides for Concentricity and Fine Surface of Bore

A floating reamer which is said to assure concentricity and a fine surface of bore has been announced by Wickman Mfg. Co., 10325 Capital Ave., Detroit 37, Mich. The blades of the reamer may be sharpened or renewed, and their floating action is said to be positive, constant, and effective throughout the full range of the reamer. The blades are properly set by a direct-reading micrometer ad-

COMET

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For holes from 1/8" upward, 15 different sizes

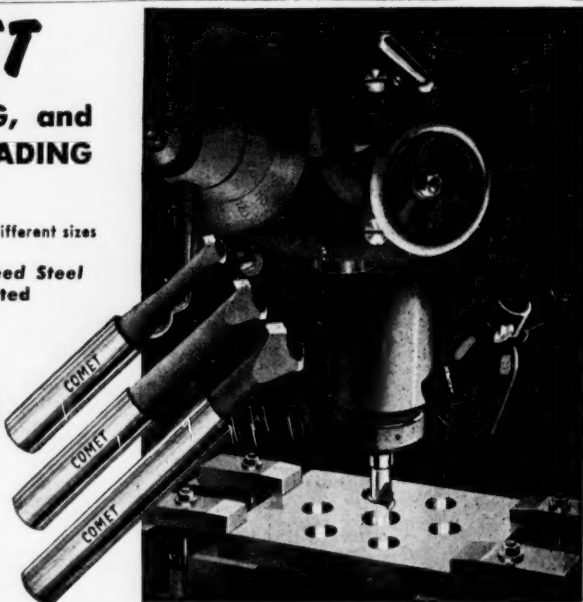
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On tapping and reaming jobs, why make set-ups the tedious way when, by using a Ziegler Floating Tool Holder, you can cut corners and complete the set-up in much less time!

The Ziegler makes this possible by doing away with the necessity of perfectly aligning the work with the spindle, as with ordinary tool holders. The Ziegler requires alignment only within 1/32" of accuracy (on the radius), compensating automatically for the difference.

Once you make a set-up with a Ziegler Holder, you will never go back to the slow, laborious and costly way of doing the job.



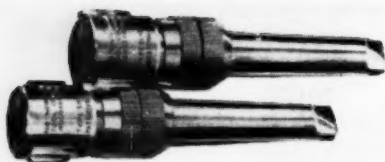
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Wickman-Brown Floating Reamers

justment without using tools or keys.
The reamer is available in two types,

the S type being equipped with standard blades and the SL type having blades designed for reaming blind holes. The reamer is furnished in 14 sizes, the diameters ranging from $\frac{3}{4}$ to 4 inches.

Adjustable Feed Mounting Adapter

H. E. Dickerman Mfg. Co., 321 Albany St., Springfield, Mass., has announced an adjustable feed mounting adapter which is designed for use with its several models of die feeds and the Rol-Di-Feed. The adapter is said to permit quick and simple adjustment of the stock line of




Dickerman Adjustable Feed Mounting Adapter

the feed with the stock line of the die, as well as alignment of the feed with the set edge of the die. The device consists of a mounting base and a feed-mounting member which is drilled and tapped to accommodate all sizes of feeds. Vertical adjustment is said to be attained through the use of a built-in screw jack, and slotted screw holes in the mounting base, which is attached to the bolster plate of the press, permit horizontal adjustment.

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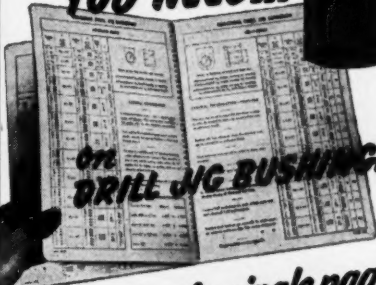
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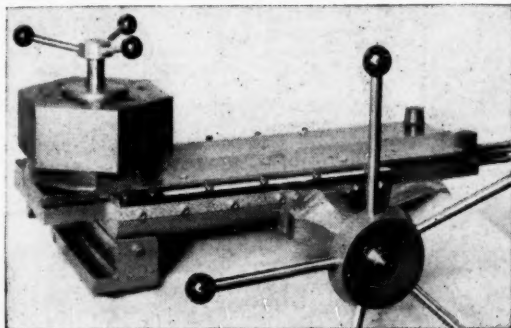
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MINNEAPOLIS, MINN.

Band Sawing Machine Uses High-Speed Steel Blade

Designated as the Model No. 800, a horizontal band sawing machine which is designed to utilize the "Milford Rezistor" high-speed steel band saw blade has been announced by Wells Mfg. Corp., 808 Tyler St., Three Rivers, Mich. The machine has a capacity for stock up to 8 inches in diameter and features a heavy-duty counterbalance frame and beam, band wheels which provide for the use of 1-inch blades, a "constant-load" blade tensioning device, and a synchronized speed



Wells Model No. 800 Horizontal Band Sawing Machine

HARDENED and GROUND HSS BLANKS
Any decimal diameter to $\frac{1}{8}$ "—in any length.
Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.
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WILLIAM T. HUTCHINSON COMPANY
235 Main St. Orange, N. J.

blade cleaning brush. Developed especially for use with a high-speed steel blade, the machine, it is claimed, can also be used effectively with standard carbon steel blades.

Shank-Type Center Features Anti-Friction Contact Bearings

A shank-type center featuring anti-friction single-row angular contact bearings in duplex has been added to its "Red-E" line by Ready Tool Co., 540 Iranistan Ave., Bridgeport, Conn. The bearings, it is claimed, are constructed of high-carbon chrome steel, forged, heat treated and finished to unusual precision tolerances, ground with offset race rings, and clamped solidly together. As the amount of offset is accurately controlled, the duplex mounting is said to provide a definite degree of preload and maximum resistance to deflection under both thrust and radial loads. Short overhang, it is

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The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 20". Typical direct prices for 10" lengths: $\frac{1}{2}$ "—\$1.36; $\frac{3}{4}$ "—\$1.36; 1"—\$1.58; 1 $\frac{1}{4}$ "—\$1.89. Write for price list.
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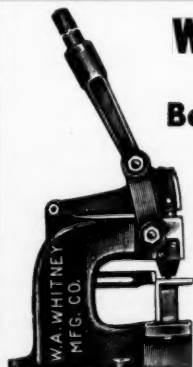
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Depth of throat —
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Capacity — $\frac{1}{2}$ thru
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Notches angles $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{8}$.

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Precision built flat, single point, carbide cutting tools.

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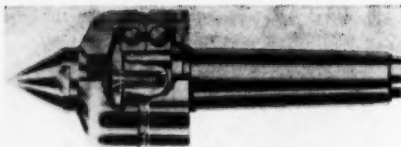
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Dayton 7, Ohio



"Red-E" Shank-Type Center

claimed, permits the work to be close to the tailstock, offering maximum rigidity.

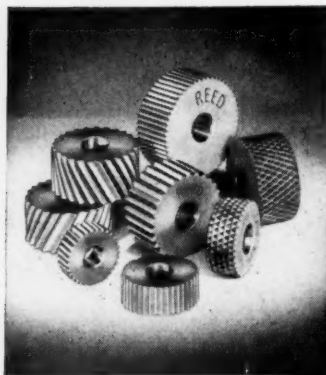
According to the manufacturer, accu-

acy can be held to 0.0001 inch with point zero, and the high-speed steel point is replaceable. The center is available in Morse tapers from No. 1 through No. 5.

Diamond Lapping Compounds and Equipment Now Supplied in Handy Kit

Penn Scientific Products Co., 5941 Alma St., Philadelphia 24, Pa., is now supplying a complete micro-finish assortment of its diamond lapping compounds and

equipment in kit form for use in the toolroom, production shop, or laboratory. Designated as the Spectrum Master Micro-Finish Kit, the unit



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Over 100 styles and sizes in stock.
Special knurls to your specifications.

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Spectrum Master Micro-Finish Kit

consists of nine Spectrum grits (sizes 120, 170, 325, 600, 1200, 2000, 3000, 8000, and 14,500), and three other grit sizes are available. In addition, the kit includes a 4-oz. bottle of diamond lapping oil, an atomizer oil applicator, an assortment of Spectrum micro laps, orange-wood sticks, and an assortment of felt mounted points. A walnut - finished sturdy wood case, complete with lock and key, is furnished to protect and preserve both the material and the equipment.

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Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments. All grip...no slip. No bearings...no heat or lost power. Instant release without stopping lathe.

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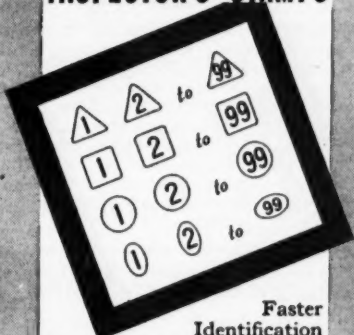
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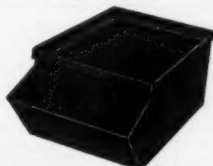
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Sterling Bin Front "Top Rim"
Steel Stacking Box.
Size: 18" x 12" x 6".

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Once you use and compare Sterling stacking boxes, you'll know why we invite comparison in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box...no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

Write for literature and prices.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.

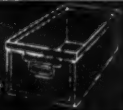


Sterling "Top Rim" Steel Stacking Box with drop handles.
Size: 18" x 12" x 6".



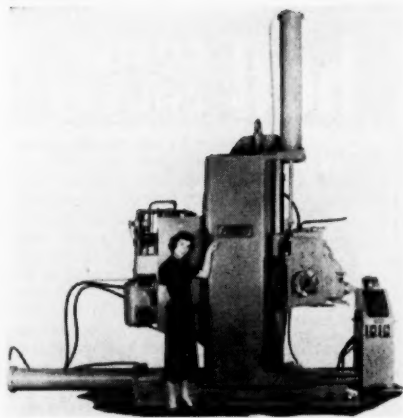
Sterling

Quality Handling & Storage Equipment



Boring and Facing Machine Handles Complicated, Irregular Castings

A machine for the complicated, irregular profile milling and boring of aluminum, magnesium castings and forgings, and cast and rolled armor plate has been developed by Forney's Inc., New Castle, Pa. Equipped with duplicator equipment with templates, the machine, according to the manufacturer, is ideal for difficult profile machining operations necessary in the manufacture of aircraft and armored vehicle parts.



Forney Boring and Facing Machine

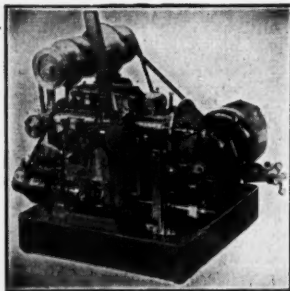
The machine features a spindle housing as a motor powered unit which moves directly into the work face. The machine is supplied with work-holding fixtures, tooling, templates, and floor plates as required by the user.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to 3/4" U.S.S. Inexpensive — Last for years.



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with revolving cutter will make 1, 2 or 3 successive cuts for watch pinions or may be used for fine pitch gears up to 1 1/2" dia. Blanks are held and indexed by work spindle and usually supported by a tail center. Only straight teeth can be cut.

WALTHAM MACHINE WORKS WALTHAM, MASS.

Pinion and Gear Cutting Machine, Thread Milling Machine, Cylindrical Sub-Presses, Cutter Sharpening Machine, Small thread milling and gear cutters, Small special machinery.

High Frequency Combustion Unit Allows for Measuring Carbon and Sulphur in Iron and Steel from One Sample

According to Lindberg Engineering Co., Laboratory Division, 2469 W. Hubbard St., Chicago 12, Ill., carbon and sulphur contents in all types of ferrous alloys can be determined in a minimum of time by means of a newly developed high frequency combustion unit introduced by the company. The unit, which employs

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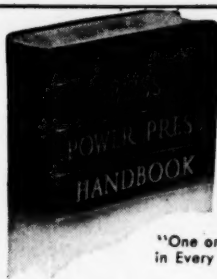
Has 2 contacts 1/32" threaded within 1/8". Double Faced. Reads front and back. Two Crystals. Double faced dial indicator complete with plated holder including 1/32" and 1/8" contacts—

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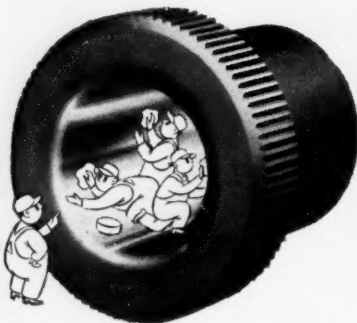
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to a minimum**



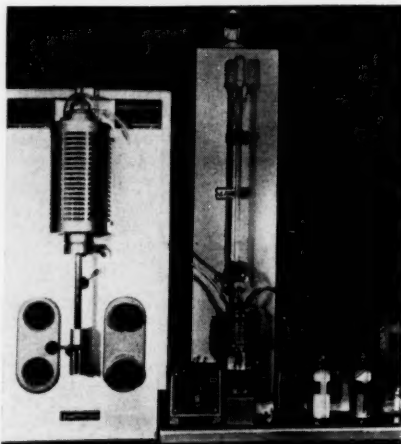
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**UNIVERSAL
ENGINEERING COMPANY**
Frankenmuth 9, Michigan

171-B

radio frequency inductive heating, is said to test for both carbon and sulphur in a single operation in ten minutes.

The Lindberg High Frequency Combustion Unit is capable of heating samples to temperatures above 3,000 deg. F. Heat is generated only in the relatively small metal sample. Thus, tubes, cruci-



Setup involving Lindberg High Frequency Combustion Unit for measuring both carbon and sulphur in iron and steel from one sample

bles, and other adjacent parts are heated only by conduction or radiation from the comparatively small mass of the sample.

Abrasives Feature New Rubber Binder

Designated as the Brightboy BL Series, a line of abrasive textures which feature a new rubber binder, carefully compounded with abrasive grain, to achieve a tough rubber cushion for the abrasive has been announced by Brightboy Industrial Division, Weldon Roberts Rubber Co., 6th Ave. & N. 13th St., Newark 7, N. J. Designed primarily for burring, polishing, and finishing operations, the textures are said to be ideal for removing heavy toolmarks from forged aluminum, smoothing weld marks, polishing and burring stainless steel, and many other operations on both hard and soft metals.

The Brightboy BL Series is available in three grades; namely, 54BL (coarse), 70BL, (medium), and 120BL (fine). The

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Brightboy BL Series
Abrasives

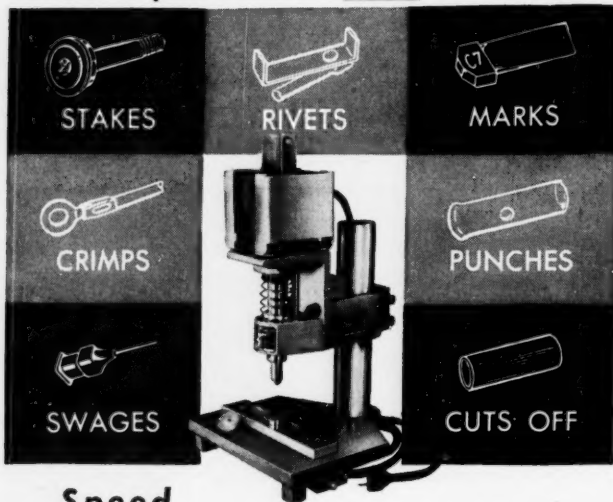
textures are made in a variety of sizes in wheels, discs, sticks, rods, cylinders, tablets, and blocks for machine and manual use. According to the manufacturer, the textures work to close tolerances and can be shaped to contour.

Inserted-Blade Shell End Mills Designed for Steel, Cast Iron, and Non-Ferrous Metals

Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich., has added to its line of standard carbide cutting tools two inserted-blade shell end mills for cutting steel, cast iron, and non-ferrous metals. The mills incorporate blades of a quick-replaceable, serrated-back design with carbide tips. The blades, it is claimed, can be secured with minimum stress by

wedges which distribute holding pressure along the entire length of the blade. According to the manufacturer, each cutter is durable and rugged.

Which Operation is Your Bottleneck?



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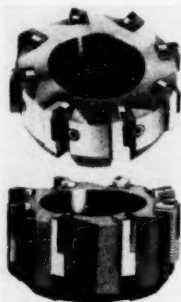
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(Top) Super Type DBSS Cutter for steel.
(Bottom) Super Type DBS Cutter for cast iron

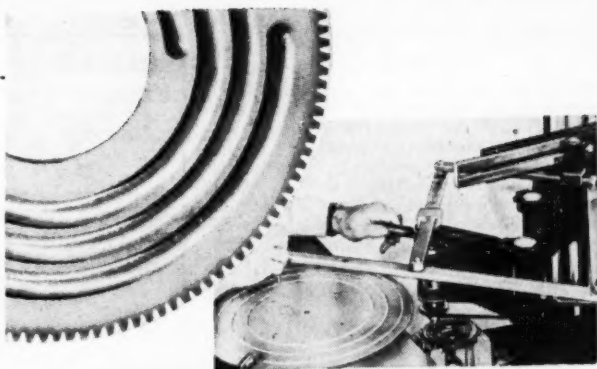
ged in body and blade construction.

The cutter designed for steel is designated as the Type DBSS and is available in 4, 5, 6, and 8-inch diameters. The cutter for cast iron is designated as the Type DBS and is available in sizes from 3 to 8 inches inclusive. Replaceable blades are also available for both cutters in suitable carbide grades.

Solid Cemented Carbide Inserts for Toolholders

Carboly Department of General Electric Co., 11143 E. 8 Mile Ave., Detroit 32, Mich., has announced an expanded line of solid cemented carbide inserts for mechanical toolholders which includes four new blank sizes in two new shapes in both the present standard unground and ground lines to provide toolmakers and other users with a wider range of carbide insert selectivity from a single source.

New sizes and shapes added to the current line of unground insert blanks are a $\frac{3}{8}$ -inch diameter inscriber-circle triangular insert; a 55 and 80-degree diamond-shaped insert; and a $\frac{3}{8}$ -inch square insert. The first three blanks are made with both standard radii and sharp corners (maximum flat 0.010 inch). The $\frac{3}{8}$ -inch square insert is manufactured with sharp corners and standard chamfers. Inserts added to the stocked standard ground line are a $\frac{3}{8}$ -inch diameter inscribed-circle triangular insert; a 55 and 80-degree diamond-shaped insert; and a $\frac{3}{8}$ -inch square insert. All triangular and diamond-shaped inserts are said to be available with special corner radii.



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with NEW HERMES *Engravo* graph

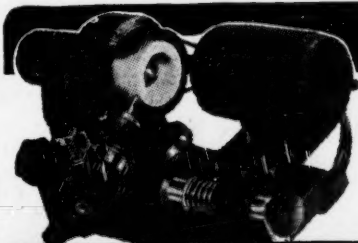
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Catalog H 27 Bench Type Model
(weight 200 lbs.)

Portable Model 1M also available

Production: 6" brass spiral
with $\frac{1}{4}$ " x $\frac{1}{4}$ " groove cut
from 3 times larger template
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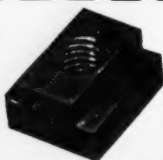
For all pantograph and routing machines

- Vibrationless
- Ball bearing grinding spindle
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NEW HERMES, INC. 13-19 University Place, N. Y. 3

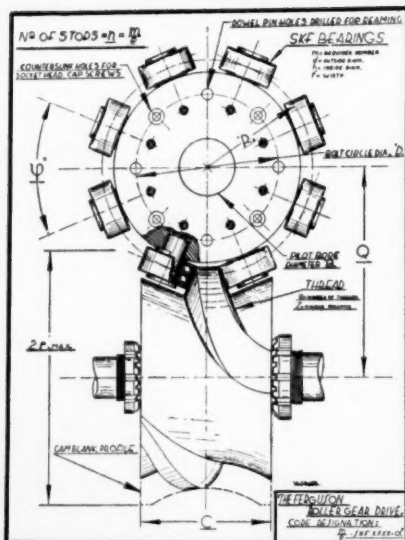
Ferguson Machine & Tool Co., Inc., P. O. Box 191, St. Louis 21, Mo., has announced that its roller gear drive, an intermittent motion or indexing mechanism which was previously offered in custom-designed models only, is now available in many standardized designs. The standardized drive is available with 6, 8, 10, and 12 stops per revolution of the



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SURE GRIP STEP BLOCKS

TIETZMANN TOOL CORP.
ENGLEWOOD, OHIO



Design drawing of Ferguson Standardized
Roller Gear Drive

output shaft and with indexing times of either $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, or $\frac{3}{4}$ of the total cycle time.

According to the manufacturer, the drive may be incorporated in new or existing machinery on applications such as indexing dials, indexing carriers, indexing conveyors, and indexing mechanisms. The drive is also to be adaptable for use on dial and roll feeds, carrier chains, and conveyors at speeds up to 800 pieces per minute. The roller gear, it is claimed, will also still be available in special designs to meet individual requirements.

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Weld Flux Scaling Hammer Features Small, Lightweight, Streamlined Design

An air-operated weld flux scaling hammer featuring a small, lightweight, streamlined design has been announced



Thor Size 5L Air-Operated Weld-Flux Scaling Hammer

by Thor Power Tool Co., Aurora, Ill. Only 7 $\frac{1}{4}$ inches long and weighing 2 $\frac{1}{4}$ lb., the air hammer, it is claimed, delivers the required speed and power for removing flux and spatter after welding. According to the manufacturer, the unit

is especially handy for corner welds and one-hand operation where space is limited. Exhaust air, blown from four holes in the front of the barrel toward the work, is said to remove loose chips and scale to maintain surface visibility.

The hammer is available in three models; namely, Size 5L with lever throttle, Size 5P with push throttle, and Size 5B with button throttle. Straight chisels, angle chisels, or mortar chisels may be used with the hammer.

Gage Provides Unique Method for Measuring Jet Engine Blade Root Sections

The Taft-Peirce Mfg. Co., Woonsocket, R. I., has completed an unusual inspection gage which measures the dimensions over rolls of serrations in the root section of jet engine turbine blades. The gaging fixture is made with tungsten carbide contacts, precision ground to a radius corresponding to the required roll dimension. These contacts are mounted



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19/32 ...	8.25	23/32 ...	9.40	15/16 ...	14.50
39/64 ...	9.00	47/64 ...	9.60	31/32 ...	15.50
5/8 ...	8.80	3/4 ...	9.60		

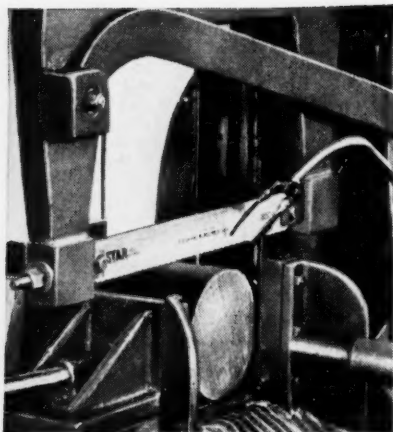
15" CUTTING FLUTE, 20" OVERALL

1 ...	\$18.00	1-1/8 ...	\$22.50	1-1/4 ...	\$25.00
1-1/16 ...	20.00	1-3/16 ...	24.00		

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STAR "Moly" Blades are sold only through recognized Distributors — the men you know and have confidence in, the men who have inventories on hand to give you fast delivery where and when you want it. It is wise to buy whatever you can from your recognized Distributor.

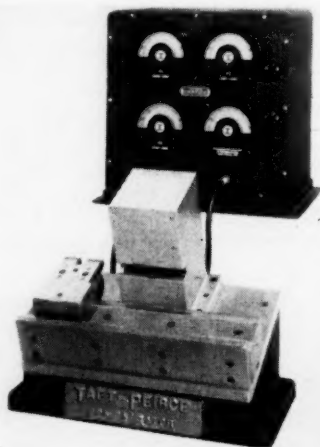


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Makers of Hand and Power Hack
Saw Blades, Frames, Metal Cutting Band
Saw Blades and Clemson Lawn Machines.

on parallel reeds to that they are free to move in both a vertical and a horizontal direction. This permits the measuring contacts to position themselves correctly, regardless of any permissible lead variations that may exist in the serrations.

Three air indicators, with dial graduations of 0.0001 inch, show dimensions as measured over rolls on each of the three serrated sections. In addition, the new Taft-Peirce Computing Indicator has been incorporated as a fourth indicator to compute automatically the difference between the amounts that each of two dimensions varies from its mean value.



Taft-Peirce Air-Operated Jet Engine Blade Root Section Gage designed to measure a part while it is still in the grinding fixture

The inspected part is rejected whenever the computing indicator shows this variation to be greater than plus or minus 0.001 inch. Furthermore, this two-point contact enables an inspector to explore any taper from end to end of the slots.

The air-operated gage is available in two types, one of which is designed so that a grinding machine operator can gage the part while it is still in the grinding fixture, thereby eliminating many costly rejects. The other type is designed as a final inspection gage to check the finished part. According to the manufacturer, an inspector can determine the exact value of the dimensions in a few seconds with the gage which requires no special operator skill to obtain extremely accurate readings.

Precision Grinder Produces Accurate Edges and Angles on All Types of Cutting Tools

Designated as the Model AP, a precision grinder which, it is claimed, will produce accurate cutting edges and exact angles on all types of cutting tools, such as carbide, Stellite, and high-speed steel, has been announced by Thomas Prosser & Son, 114 Wall St., New York 5, N. Y. According to the manufacturer, all front, side, and top angles can be set precisely in both vertical and horizontal planes, and the feed of the tool toward the grinding wheel is accurately controlled by a micrometer feed knob which is graduated in thousandths of an inch.

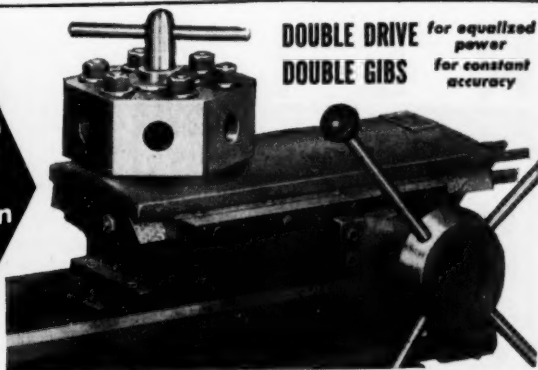
One side of the grinder is equipped with a quick-acting indexing table which, it is claimed, can be instantly and accurately set to the required angle and which remains fixed in position without the need of locking devices. The tool can be rapidly rough-ground by hand on a vitrified or diamond wheel, making necessary only a slight amount of grinding on the finishing wheel using the reciprocating action toolholder to obtain accurate angles,



Prosser Model AP Precision Grinder

straight edges, and finish. Various accessories for grinding radii, chip breakers, drills, and so on, are available. The grinder can be supplied in both bench and floor types.

Enco
Self-Indexing
HEXTURRET
For Lower Production
Costs and Speedier
Output

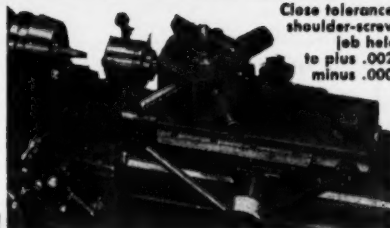


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Reasonable Deliveries

Improved Bending Machine More Evenly Distributes Stress and Strain

The redesign of its hydraulically-operated Di-Acro Hydra-Power Bender to more evenly distribute the stress and strain developed during bending and also to keep mechanical distortion to a minimum has been announced by O'Neill-Irwin Mfg. Co., 576 Eighth Ave., Lake City, Minn. According to the manufac-



Improved Di-Acro Hydra-Power Bender in use



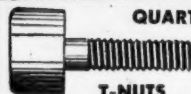
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TOTE PANS

Sturdy 16 ga. metal.
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x 6 1/4" deep. Drag
holes and handles at
both ends.

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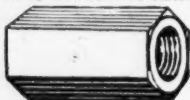


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Used for machine
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Avoid damage to table slots.

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And machine handles, levers,
cranks, cast iron knobs, etc.

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turer, changing the design of the bending table from fabricated steel to a strongly-ribbed alloy casting provides greater strength during bending and also allows for the integration of the gear housing into the casting, assuring positive alignment.

Additional improvements made on the bender include the addition of foot controls, as well as hand controls, which free the operator's hands for material handling and work positioning; the replacement of a 2-h.p. motor with a 3-h.p. motor; and the use of 1/4 to 1/2-inch steel plate instead of sheet fabrication in the cabinet.

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3 SIZES — 4 MODELS — 6" to 12"

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3525 Cardiff Ave., Cincinnati 9, Ohio

Power Nibbler Features Detachable Crankcase

Designated as the Model G, a power nibbler which features a detachable crankcase has been announced by Nord International Corp., P. O. Box 44-N104, Denver, N. J. According to the manufacturer, the nibbler is capable of beading, folding, cutting straight or circular, slotting, and louvering, as well as irregular or freehand cutting by making simple adjustments with accessories which are provided as standard equipment. The nibbler mechanism operates in an enclosed oil bath, and the detachable crankcase is said to be so designed as to permit the construction of special frames for special purposes. The lower toolholder has the same center line as the upper holder, and a handwheel is said to enable a fine adjustment to be quickly made to any desired setting.

The machine, it is claimed, is capable of changing from circular to straight cutting without removing the lower slide block. The range of materials which can be cut by the nibbler are said to be $\frac{3}{8}$ inch continuous cutting of cold rolled steel ($\frac{1}{8}$ -inch short cuts), $\frac{1}{4}$ inch in stainless, and $\frac{3}{8}$ inch in brass or copper. The



Nord Model G Nibbler in use

machine is claimed to be capable of cutting a maximum circle of 28 $\frac{1}{2}$ inches in diameter and a minimum circle of 2 $\frac{1}{2}$ inches in diameter. Folds to $\frac{3}{8}$ inch and beading to $\frac{3}{8}$ -inch plate thicknesses are said to be readily accomplished. The machine measures 50 inches long x 31 $\frac{1}{2}$ inches high x 13 inches wide overall and has a throat depth of 28-17/32 inches.



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LIGHT • STRONG • FAST • ACCURATE

Tubular frame construction assures light weight with maximum strength and rigidity plus advantage of minimum thermal expansion or contraction.

Tubular Indicator Gages are easier to use, speed production, reduce fatigue and encourage accuracy. Dial indicators give instant visual readings in English or Metric.

Indicators are attached to adjustable offset mount, not to stem, to avoid damage through rough usage. Gages furnished with interchangeable mandrels, sliding bar mandrels or snap gage block as desired. Standard sizes, 4 $\frac{1}{2}$ " to 54". Special larger sizes available.



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Box 40, St. James, Minnesota

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City _____ Zone _____ State _____
Firm _____ Position _____

Universal Handle for Reversible Go and No-Go Plain and Thread Plug Gages

A "Universal" handle for reversible go and no-go plain and thread plug gages in cabinet sets has been developed by Size Control Co., 2500 W. Washington Blvd., Chicago 12, Ill. Each gage member is supplied with an aluminum bushing which is said to permit the user to make up multiple combinations of go and no-go sizes in the handle. According to the manufacturer, eight handles in a set will accommodate a range of plugs from 0.010 to 0.750-inch diameter. The handle is



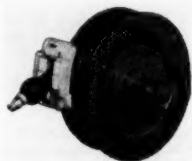
Size Control "Universal" Gage Handle

made of anodized aluminum. Plug members can be adjusted to required length to minimize breakage.

Bench-Type Hose Reel Accommodates 12 Feet of Hose

William Turk Co., 11070 S. Alameda, Lynwood, Calif., has added to its line of

"Croft" equipment a bench-type hose reel which will accommodate 12 feet of hose for handling air, water,

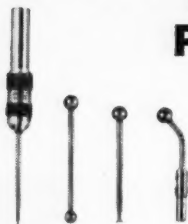


"Croft" Hose Reel

oil, or any fluid under normal pressure. Designed especially for use on benches and machine tools, the unit can also be mounted on walls, ceilings, posts, or floors and can be banked in a series of two or more.

The reel is fabricated from heavy gauge steel, and the springs are said to be protected by a free-wheeling device. Swing joints are made of brass and cast iron to minimize corrosion. Four O-rings, it is claimed, seal the joints. The hose reel is designed to accommodate $\frac{1}{4}$, $\frac{3}{8}$, and $\frac{1}{2}$ -inch hose.

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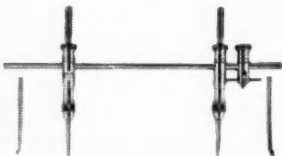


WIGGLERS

Two models. Attachments held firmly by ball swivel joint, which permits adjustment to angles or true center.

TRAMMELS

Easier to use and more accurate. Fine thread adjusting screw on one tram. Chuck accommodates extra attachments. Ball points available.



RADIUS GAUGES

3 models each in two styles. Leaves give full and true radius. Case protects leaves. Locknut holds leaves securely in position.

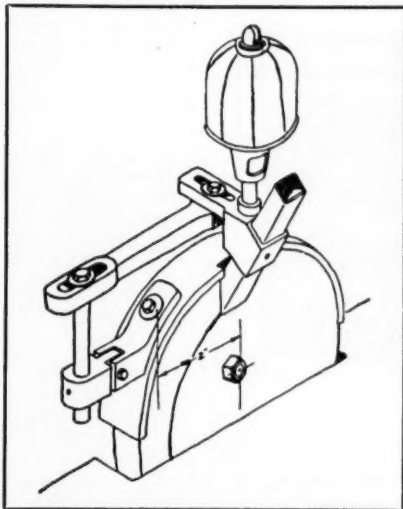
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Oil and Coolant Applicator

Carbide Finishing Products, 95 Buckingham Ave., Milford, Conn., has announced a Precision Oil and Coolant Applicator for cleaning and applying diamond wheel oil or coolant to diamond wheels. The applicator utilizes an automatic-adjusting gravity wick principle which is said to ensure a continuous oil or coolant flow on the wheel. Since wick contact with the wheel is by gravity, no adjustments for wear are said to be necessary. The oil saturates the felt wick and is transferred to the wheel.

The gravity feed oiler incorporates a



Drawing showing Precision Oil and Coolant Applicator installed on grinding wheel

clear plastic reservoir with a 4-oz. capacity, a flow adjustment, a drop adjustment, and a lever shutoff.

The applicator is available in two types; namely, the Type S for use on surface, chip breaker, cylindrical or other fixed feed peripheral grinders and the Type O for use on 6 or 7-inch diameter plain cup (face) diamond wheels.

Micrometer Head Features Non-Rotating Spindle

Boeckeler Instrument Co., 53 E. Rillito St., Tucson, Ariz., is now distributing the Tavannes Micrometer Head which fea-

Producers Pare Stamping Costs

Modern Coil Handling Equipment Widens Use of Low Cost Coil Stock

The battle to keep down costs is going well for producers of stampings. Coil stock and modern coil handling equipment are the decisive factors. Coil stock, with only two scrap ends to its entire length is far more economical than strips of straight stock with two scrap ends to every ten feet. Moreover, the type of coil loading and handling equipment built by F. J. Littell Machine Co. makes coil stock easier to handle than straight stock. Stamping producers are taking full advantage of these developments. Coil stock and Littell Coil Hooks, Reels, Straightening Machines and Automatic Roll Feeds are in wider use today than ever before.

Hooks Serve Two Ways...

Littell Hooks make it a simple matter to unload coils on delivery, and to load reels. The variety of sizes have lifting capacities from 1,000 to 40,000 pounds.



Two Types of Reels...

Littell Coil Cradle Reels mount heavy coils, up to 30,000 pounds. Spindle Reels handle coils up to 40,000 pounds. Each type is available in plain or motor driven designs.



Straighteners Flatten Stock

... Removing curvature from coil stock as it passes from reel to punch press die is the function of Littell Straightening Machines. All models are the same basic design. Variation is in the number and diameter of straightening rollers employed... from 1" to 90" in width, and from .010" to .125" thickness.

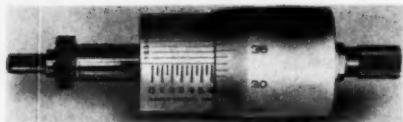


Automatic Roll Feeds ... Press output in many shops has been multiplied five times by simply attaching Littell Roll Feeds to presses for blanking, drawing, piercing, or cut-off work. The Littell Roll Feed is used with compound dies, single station dies, and progressive dies. Standard models are easily attached, serve all types of presses, and handle all standard widths and thicknesses of stock.

Descriptive details and prices on Littell Hooks, Reels, Straighteners and Roll Feeds are available on request. Inquiries are given immediate attention when addressed to

F. J. Littell Machine Co.

4163 N. RAVENSWOOD AVE., CHICAGO 13, ILL.



Tavannes Non-Rotating Spindle Micrometer Head

tures a non-rotating spindle. Used as standard equipment on the Boeckeler Model No. 1 Optical Micrometer, the unit is now available as a separate item for general mechanical and electronic appli-

cations. According to the manufacturer, the head has a 1-inch range and reads by vernier to 0.0001 inch.

Counterbalance Cylinder for Punch Presses or Power Brakes

The Dayton Rogers Mfg. Co., Minneapolis 7, Minn., has announced a power press counterbalance cylinder which, it is claimed, can be readily installed on all punch presses or power brakes and similar equipment to provide a smooth action and to decrease wear on the ram clutch mechanism. According to the manufacturer, the cylinder

serves as a brake, not only eliminating the over-riding of the ram on mid-stroke but absorb-



Dayton Rogers Power Press Counterbalance Cylinder

ing the percussion shock or blow of the punch press when the punch section of the die breaks through on blanking operations. The cylinder is available in sizes from 5 to 12 inches for a wide variety of power press strokes or adjustments.

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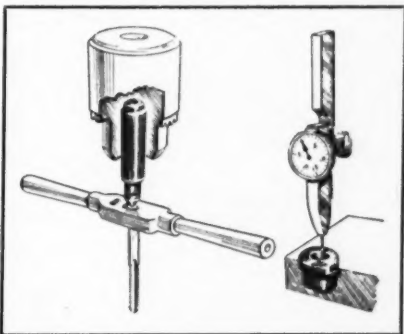
418-422 Livernois Ave. • Detroit 9, Michigan

Jig Boring Aids

The Medelton Co., Inc., 628 Westchester Ave., Bronx 55, N. Y., has announced a spring center, which is said to enable the operator to tap holes square and in the precise location at the same time the work is being drilled, and an edge locator, which is designed to enable a jig borer operator to quickly locate the spindle over the work edge to "tenths." Designated as the "Tap-Go," the spring center is designed to telescope $\frac{3}{8}$ inch while being used in a standard $\frac{1}{2}$ -inch drill chuck. According to the manufacturer, the alignment is maintained all along the $\frac{3}{8}$ -inch travel of the center in its housing. To operate the center, the spindle is lowered onto the tap, the spring is loaded and the tapping operation is started, using both hands to maintain even pressure.

The edge locator, designated as the "Zero," is said to be simple in design and easy to handle. In use, the spindle is centered over the work edge by holding the locator on the edge of the work by hand, with the indicator held in the spindle. The indicator is then lowered into the center of the locator along the work edge, moving the table at right

angles to the edge. The resulting location, it is claimed, is accurate to tenths. The locator is also said to enable the oper-



(Left) Medelton "Tap-Go" Spring Center.
(Right) Medelton "Zero" Edge Locator

ator to set the indicator to describe a 0.5000-inch circle which, in turn, can be used to locate the spindle in relation to irregular shaped work surfaces.

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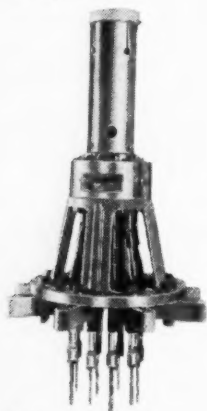
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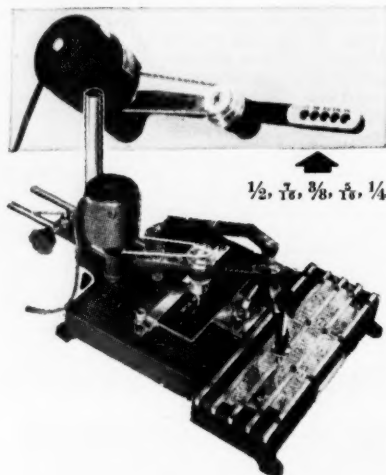
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 chucks for straight shank drills.

Send us your applications for quotations on the proper head for your jobs. No obligation, of course.

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Improved Engraver Offers Five Ratios

Green Instrument Co., 392 Putnam Ave., Cambridge 39, Mass., has announced changes in its engraver, offering five ratios to provide a complete range of cut letters in reduction $\frac{1}{2}$, $\frac{7}{8}$, $\frac{3}{4}$, $\frac{1}{2}$, and $\frac{1}{4}$ of the master size type in various styles ranging from $\frac{1}{8}$ to 2 inches in height. According to the manufacturer, the advantage of maintaining accurate settings is kept, while small steps of size varia-



$\frac{1}{2}$, $\frac{7}{8}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{1}{4}$

Green Improved Engraver

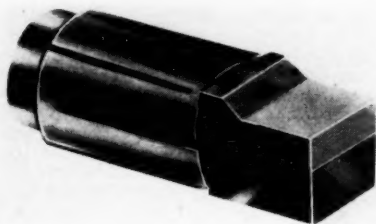
tion from one set of master type are available. The changes in the engraver are said to make it a more versatile instrument with a high degree of accuracy and precision.

Heretofore, only ratios of $\frac{1}{2}$, $\frac{3}{4}$, and $\frac{1}{4}$ were available. The new additions of $\frac{7}{8}$ and $\frac{1}{2}$ make five positive positions which, it is claimed, may be set easily and accurately by unskilled operators.

Expanding Tool Bit Makes Cutting Assembly One Solid Unit

An expanding tool bit which is said to be quickly and economically adaptable to a holder for single or multiple applications and which makes the cutting assembly one solid unit, free from movement and vibration, has been announced

by Expanding Bit Corporation of America, 207 Market St., Newark, N. J. Adaptable for a wide variety of applications, the tool bit, it is claimed, provides the necessary cutting angle through its unique positioning. According to the manufacturer, precise micrometer ad-



EBC Expanding Tool Bit

justment for positioning the expanding bit is afforded by the use of a standard micro bushing, and the bit can be tightened and adapted for various setups by simply turning a clamp nut with a standard hex key.

The bit can be incorporated, it is claim-

ed, in tools for milling machines, special machines, boring machines, automatic and semi-automatic screw machines, drill presses, and turret lathes and is available in nine sizes and seven styles for forming, grooving, facing, turning, boring, chamfering, milling, rough and finish threading, and machining to square shoulders.

Self-Locking Spring-Pin Fastener Is Vibration-Proof

Designated as the Sel-Lok, a self-locking spring-pin fastener which is said to be vibration-proof, shock-absorbing, and easy to insert and remove has been announced by Standard Pressed Steel Co., Jenkintown 22, Pa. According to the manufacturer, the spring pin is heat treated and is as strong as a solid cold-rolled steel pin of the same diameter. The fastener is available in standard and light-duty wall thicknesses, in diameters from $\frac{1}{16}$ to $\frac{1}{2}$ inch, and in a wide variety of lengths. Heavy-duty pins can be supplied on special order. The fastener is made of either carbon steel or corrosion-resistant steel. Copper and aluminum-based pins can be furnished as special. The plating

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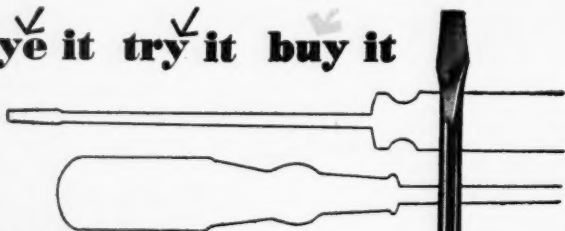
2505 WASHINGTON BOULEVARD
BELLWOOD, ILLINOIS



Three sizes of Sel-Lok Spring Pin

available includes zinc and cadmium. The pins, it is claimed, can be used as hinge pins, clevis pins, cotter pins, and in almost any situation where two components are to be fastened together.

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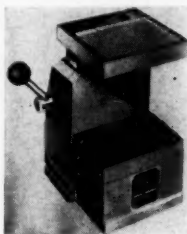
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Jig Vise Incorporates Air Control Valve as Integral Part

Suprecision Products, 2447 Nicollet Ave., Minneapolis 4, Minn., has announced the "Powered-Air" Jig-Vise which incorporates an air control valve as an integral part, thus providing instantaneous response of the clamping plate. A positive double-action air cylinder, powered by a single air line, is said to permit easy movement and maximum flexibility of the unit. The vise can be clamped permanently into position for constant production work or temporarily clamped for

job lot production. According to the manufacturer, all clamping and nesting plates are made for accuracy



"Powered-Air" Jig-Vise

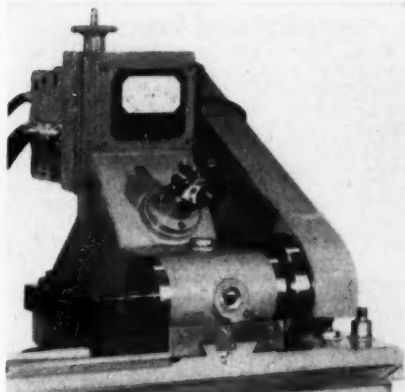
of position, and any set of plates is interchangeable.

The clamping pressure of the vise is 10 times that of the air line pressure, and the clamping pressure can be controlled by varying the air line pressure. The double-acting air cylinder, it is claimed, exerts equal pressure and speed in either direction. The unit is made of aluminum, cast iron, and stainless steel, with all moving parts completely enclosed from chips and other foreign matter.

Thread Milling Machine Features Hydraulic Head

Hanson-Whitney Division of Whitney Chain Co., Hartford, Conn., has announced a thread milling machine featuring a hydraulic head which is said to absorb and distribute the vibration of heavy cuts at high speeds while generating smoothly finished threads. Speeds are said to be infinitely variable up to 3,000 r.p.m., and an unusual application of adjustable-speed hydraulic motors to the cutter spindle drive and the work spindle drive permits the balancing of cutter speed and work feed, thus affording a favorable cutting condition for the material used and permitting the use of carbide cutters where applicable. Adjustments, it is claimed, are instantly possible during the operating cycle.

Hydraulic power developed from an independent pressure plant is also applied to other actions needed on the machine, such as work chucking and carriage movement. According to the manufacturer, feeds are from 6 seconds to 1 minute per revolution, and rapid traverse time is approximately 4 seconds. Speeds and feeds, it is claimed, are variable without changing gears, and all actions are auto-



Hydraulic head of Hanson-Whitney Thread Milling Machine

matic except handling of workpieces.

The machine is available in four sizes; namely, 4 x 9 inches, 10 x 24 inches, 15 x 30 inches, and 20 x 48 inches with bed lengths to meet user requirements.



SS-3 3/16" slitting cap;
5/16" trimming; 1/4"x2"
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Torque Testing Fixture Has Many Practical Uses

P. A. Sturtevant Co., Addison, Ill., has announced a universal torque testing fixture which is said to have a wide variety of practical uses. A fully adjustable spindle set in instrument bearings is said to be held in rigid alignment and permits rapid engagement of the driver with the workpiece. The spindle has a female drive square to accommodate a wide selection of torque wrenches within the capacity of the fixture. The driving end



Sturtevant Torque Testing Fixture

of the spindle is threaded so that users may design drivers for special applications. A standard male drive square attachment is included with the fixture and is fitted to the driving end of the spindle to permit the use of regular sockets, socket screw drivers, and so on, without alteration. A T-slot base is utilized making it convenient for clamping nests and a holder to the fixture.

The fixture is available in two models; namely the Model TTF $\frac{1}{4}$ with a capacity of 0 to 200 inch-pounds and the Model TTF $\frac{1}{2}$ with a capacity of 0 to 150 foot-pounds.

Bar, Pipe, and Rod Unit

Designed to solve unusual storage problems, a steel bar, pipe, and rod unit now being manufactured by Lyon Metal Products, Inc., Aurora, Ill., is said to be

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Supreme
**LAY-OUT AND
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Lyon Bar, Pipe, and Rod Units

easy to load and unload, and is particularly useful for storing lengthy material in a minimum of space. The unit is available in double-face models for center or open floor use and in single-face models for use against a wall. The unit is finished in a green baked-on enamel.

Lathe Attachment Provides Cross Slide Accuracy to Tenth of Thousandths

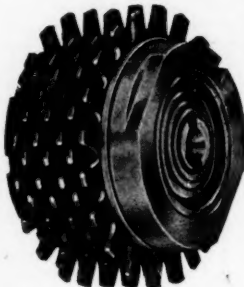
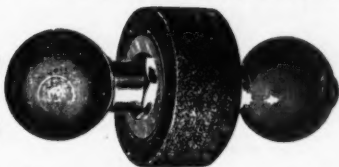
Identified as the "Microturn," a lathe attachment which is said to allow an inexperienced operator to accurately adjust and hold to tenths of thousandths on the cross slide has been announced by L. G. Arpin Co., 261 Hurlbut St., Orange, N. J. The dial of the attachment is graduated in tenths of thousandths of an inch. The Microturn utilizes an 80-pitch thread which is completely encased in thrust and needle bearings. For every complete revolution of the thread, the tool position advances 0.0125 inch. Accuracy with the attachment, it is claimed, does not depend on the accuracy of the lathe feed screw, as the feed screw does not rotate but merely moves forward or backward, serving as a connecting rod between the attachment and the cross slide.

According to the manufacturer, the Microturn can be easily mounted on any one of nine different lathe models in less than 30 minutes. To mount, the cross-feed screw and bushing are removed, as well as the cross-feed nut which must be drilled into the Acme thread section to

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HANCHETT MANUFACTURING CO.

BIG RAPIDS, MICH.

MM-112

PORTLAND 4, ORE.



"Microturn" Lathe Attachment

accommodate a special locking bolt. The attachment is then placed into the same position that the original cross-feed screw bushing formerly held and is screwed into the apron of the lathe. The Micro-

turn, it is claimed, in no way affects the normal operation of the lathe, and power cross feed is also not affected.

Self-Aligning Sub Press Is Designed for Operations on Small Piece Parts

Price Machine Products, 929 W. 80th St., Los Angeles 44, Calif., has announced the Paragon Self-Aligning Sub Press which is said to increase production on a wide variety of presses by eliminating

the need for complicated setups for staking, piercing, bending, forming, and assembling operations on small

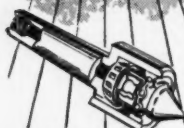


Paragon Self-Aligning Sub Press

piece parts. Designed for use with kick, arbor, air, or punch presses, the sub press, it is claimed, provides accurate alignment since the ram and lower tool holes of the sub press are line bored to precise tolerances.

According to the manufacturer, each operation can be tooled in a matter of seconds and the setup left permanently in the sub press. When a change in opera-

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Save surface, prevent damage to work. Replaceable tips of super-durable plastic outwear other types of soft face hammers. 5 grades of hardness, 14 weights.

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Name.....

Company.....

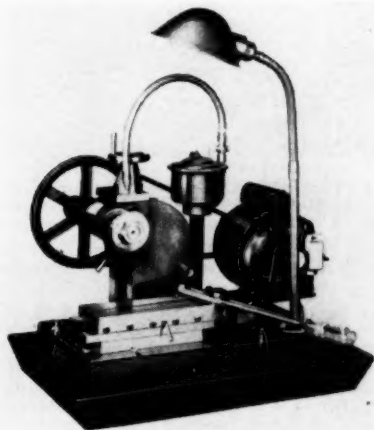
Address.....

City..... Zone..... State.....

tion is desired, the sub press containing the required setup is put in place on the power or hand press bolster and the production run can be immediately resumed.

Bench-Type Mill Is Designed for Light Milling Operations

A bench-type mill which is said to be capable of performing precision work on a wide range of light milling operations has been announced by Viking Industries, 220 Montague St., Rockford, Ill. The mill utilizes interchangeable pulleys which



Viking Bench-Type Mill

make possible a wide range of speeds up to 7,000 r.p.m. A heavy-duty precision-type spindle mounted on heavy ball bearings is said to assure accurate, noiseless operation. The spindle is designed with a $\frac{1}{8}$ -inch through hole and a No. 7 B&S taper for mounting arbors, shanks, and adapters.

The machine incorporates a $3\frac{1}{2} \times 9 \times \frac{1}{4}$ -inch set-up block which is provided with keyways on the top and bottom at right angles. A single slide table having large dovetail ways and adjustable gibbs is said to permit a 4-inch travel. An adjustable stop at both ends limits travel. The unit is powered by a $\frac{1}{2}$ -h.p. single-phase motor operating on 110-volt 60-cycle a.c. The mill is also equipped with a self-contained motor-driven coolant pump designed to operate with all types of water soluble coolants.

June, 1953

NUMBERALL

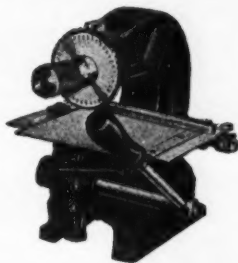
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New Model 40B

NUMBERING and LETTERING PRESS

Mono Wheel — Automatic Spacer

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New Model 40B

Write for Bulletin MS40B

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

MODERN MACHINE SHOP 369

Combination Electric Production Screw Driver and Tool Balancer for Assembly Line Operations

Known as the "Tempo Twins," a combination electric production screw driver and tool balancer which is said to be paired to boost assembly line efficiency has been announced by Mall Tool Co., 7814 S. Chicago Ave., Chicago 19, Ill. The screw driver is a Model ES10 equipped with a 115-volt ball-bearing motor; however, a 230-volt model is also available. The tool incorporates a switch of the



Mall "Tempo Twins" Combination Electric Production Screw Driver and Tool Balancer in use

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3306 UNION STREET, GLENBROOK, CONN.

lever type, normally off. The driving clutch is engaged when pressure is exerted on the bit, and reversing is accomplished by turning a knurled ring 45 degrees. Operating at 1,200 r.p.m., the disengaging torque, it is claimed, may be varied by a simple setting of the spring pressure. The screw driver has a capacity for a self-tapping No. 10 machine screw or a non-tapping 1/4-inch machine screw. The butt end of the tool has a bail for overhead suspension from the tool balancer. Ten feet of rubber-covered cord is furnished.

The tool balancer, mounted overhead, holds a 15-foot steel cable in a streamlined steel housing. Reel tension is said to be easily adjusted, and the reel has oilless bearings that are claimed to re-



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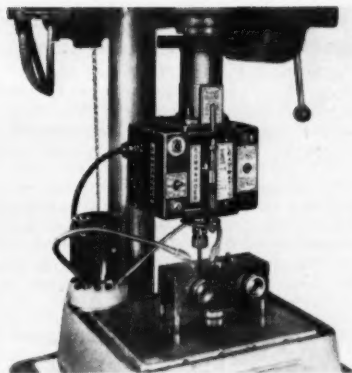
GAMMONS HOAGLUND CO.
MANCHESTER 2, CONN.



quire no maintenance. The tool, it is stated, retracts when released, thus assuring safe handling of equipment and convenience for the operator. The balancer will accommodate a drill, nut runner, grinder, or other portable tool weighing up to 10 pounds.

Lead Screw Tapping Attachment Fits Any Drill Press

Identified as the "Lead-Matic," an electrically - controlled automatic high-production lead-screw tapping attachment which has a range of from No. 0 to $\frac{3}{4}$ inch has been introduced by Commander Mfg. Co., 4224 W. Kinzie St., Chicago 24, Ill. Simple electrical controls, located on the face of the unit, are said to provide for quick and easy selection of the proper tapping action, either jog or cycle, best suited to the particular tapping operation. The taper is provided with a precision-ground lead screw which pilots the tap into the workpiece. According to the manufacturer, accurate thread lead and concentricity are assured, as the lead screw provides both the concentricity and tapping lead while the drill press merely provides rotation.



Commander "Lead-Matic" Tapper installed on a drill press

The taper is also said to provide automatic reversal of the tap; thus, no drill press motor reversal is required. A hand, foot, or fixture switch, as well as interchangeable, hardened, and ground lead screws and bronze nuts, are available for the unit.

Sharpens metal saws in gangs milling cutters, too!



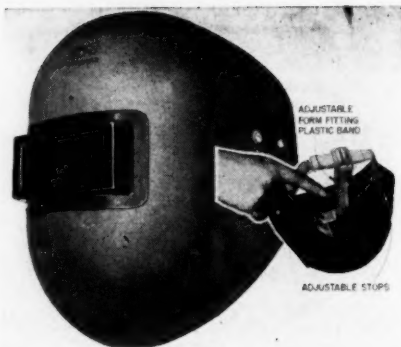
Sharpens saws from 2" to 8" in diameter in gangs up to $3\frac{3}{4}$ " thick. Automatically indexes a gang of saws, one row of teeth at a time, and sharpens them with accuracy of $\pm .001$ " for entire lot. Salvages milling cutters and saws that might otherwise be scrapped. Write for literature on 57 T automatic grinder.



THE WARDWELL MFG. CO., 3166 Fulton Rd., Cleveland 9, Ohio.

Arc-Welding Head Shield Is Designed for Operator Comfort

Designated as the "Comfort-Shield," an arc-welding head shield designed specifically for operator comfort has been announced by The Lincoln Electric Co., Cleveland 17, Ohio. The feature of the shield is a permanently pliable head band made of plastic which, it is claimed, will not dry out and curl up. The adjustable band is said to fit the head the same way a hat does, providing a firm but comfortable fit throughout the day. The band fits around and over the head and can be put on with one hand.



Lincoln "Comfort-Shield" Arc-Welding Head Shield

The shield is made with one-piece molded-fiber construction which results in both lightweight and strength. The shield has wide and deep clearance around the head to permit free circulation of air. The normal chin strap has been eliminated, and adjustable stops on each side of the head band limit the drop of the helmet to any point desired by the welder. The stops prevent the shield from hitting the nose or chin when welding vertical or overhead.

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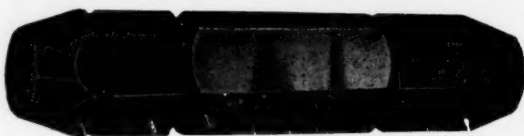
Wilmerding, Pa.

Carbide-Tipped Boring Tools

A line of carbide-tipped boring tools for machining steel, cast iron, non-ferrous metals, and non-metallics has been announced by Ariel Products Co., 4050 W. 123rd St., P. O. Box 111, Blue Island, Ill. The line includes boring tools for engine and production lathes; right and left-hand turning tools, cut-off or straight grooving tools, radius grooving tools, and

COLLET TYPE PIN GAGE HANDLE

Rushings for cylindrical and thread plug gages.



RED

GREEN

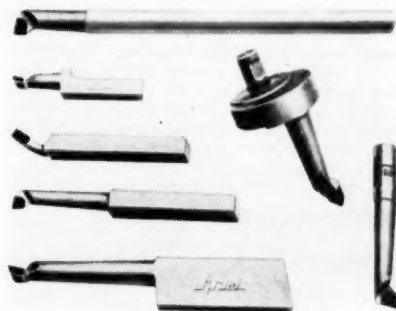
Complete line of gage supplies, handles, blanks, ring gage parts, etc. from stock.

HURON MACHINE PRODUCTS INC.

6252 Monroe Boulevard
DEARBORN, MICHIGAN

60-degree threading tools for industrial lathes and homecraft; boring tools for tool post turrets; conventional deep-boring bars to fit in standard holders; offset boring tools for extending the normal

tools are of one-piece construction, and the only wrench needed for the tools is a tool post wrench.



Ariel Carbide-Tipped Boring Tools

boring capacity of boring heads $2\frac{1}{4}$ inches diametrically; jig boring tools for $\frac{1}{2}$ and 1-inch jig boring heads; and special tools made to user specifications. The

Live Center Features Precision Preloaded Journal Bearings for High-Loading Capacities

Designated as the Bulflex Model FHH, a live center which features precision preloaded journal bearings for high-loading capacities while sustaining maximum rigidity has been announced by Bultool Co., 243 W. Congress St., Detroit 26, Mich. The center incorporates a high-speed steel tool point, ground under loading in its own bearing, which is said to maintain a concentricity of 0.0003-inch total indicator reading. The radial bearings of the center take no thrust load, and thrust bearings are spring loaded.

According to the manufacturer, the center produces accuracies of from 0.0000 to 0.0003 inch total runout and can be shifted between heavy lathe turning and high precision cylindrical grinding operations. The center is said to require no lubrication and utilizes a neoprene oil seal at the back of the head to protect it from chips, dust, scale, and coolants.

Chicago

MOUNTED

Wheels



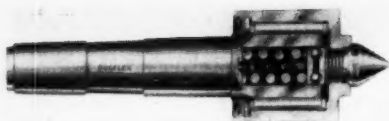
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Dept. MMS, 1101 West Monroe Street, Chicago 7



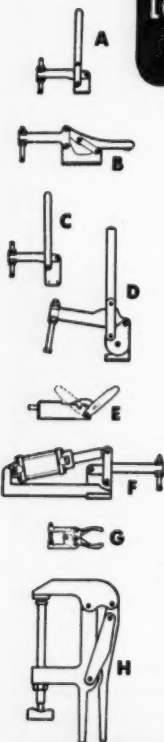
Bulflex Model FHH Live Center

The unit, it is claimed, can be used on grinding machines, lathes, milling machines, turret lathes, gear cutters, and other heavy-industrial machinery.

15-Foot Caliper Accurately Measures to Thousandths of an Inch

A 15-foot caliper which is said to accurately measure to thousandths of an inch to fill the precision measuring and checking requirements of firms using large jigs, fixtures, machine tools, and so on, has been added to its Etalon line by Alina Corp., 401 Broadway, New York 13, N. Y. The caliper utilizes a one-piece solid steel blade which is said to reduce the margin of error. High-grade chromenickel steel, given a special normalizing treatment after hardening to minimize distortion and alteration in length, is used in the construction of the caliper.

The complete Etalon line of calipers includes sizes



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- G pliers
- H C clamps

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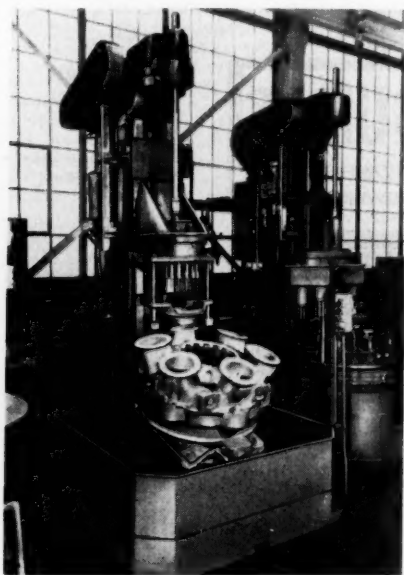


Illustration showing the smallest and largest calipers in the Etalon line

ranging from 4 inches up to the 15-foot size described above.

Vertical-Column Hydraulic Drill Is Equipped with 14-Spindle Drilling Head

For defense production work, Standard Machine & Tool Co., Ltd., Windsor, Ontario, has developed a 10-h.p. vertical-column hydraulic drill which is equipped with a 14-spindle drilling head and bush plate. The drill column is a Model VDH10 "Drillmaster," complete with geared drive head and John S. Barnes hydraulics. On the base of the machine is a six-



"Drillmaster" 10-H.P. Vertical-Column Hydraulic Drill

station index table with a work-holding fixture.

The accompanying illustration shows the machine set up for drilling and counterboring two holes in each of six flanges on a Duralumm body casting for a jet engine.

Offset Boring Chuck Has Dead-Centering Feature

Last Word Sales Co., 18500 Mt. Elliot, Detroit 34, Mich., has announced the

Economy ELEVATING Table



ELEVATING TABLE EXTENDED

For feeding sheet stock, supporting fabricated frames, handling heavy dies, or as a portable work bench. All four sides are accessible to the user.

Lifting and lowering load is hand operated. Crank handle can be attached and operated from either end, with two speed lifting. Self locking worm and screw elevating mechanism holds work at any height without danger of falling. A foot operated floor lock holds table stationary when in use.

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4507 W. Lake St., Chicago 24, Ill.



Samson Heavy-Duty
Offset Boring Chuck

tools, and similar tools in milling machines and boring mills of various types.

Samson Heavy-Duty Offset Boring Chuck which is said to have a positive dead-centering feature, for drilling and milling, that eliminates the necessity of chuck removal. The chuck is designed for holding boring bars, drills, end mills, fly

An extra-large dial with a micrometer screw is incorporated in the chuck, making possible precision adjustment of offset and an accurate resetting for duplicating operations. The chuck has a one-piece body and shank which is all-steel, hardened, and ground. All moving parts are lapped.

According to the manufacturer, the boring chuck is available with any desired type of shank or adapter, and a complete set of interchangeable accessories made of alloy steel can also be supplied. The accessories are said to be heat treated and ground to a 0.0005-inch slip fit in the tool block of the chuck.



Carter MICRO-GUIDES

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More and more leading band-saw machine manufacturers are standardizing on Carter Guides for economical, trouble-free operation.

CARTER PRODUCTS COMPANY, INC.

426 Wm. Alden Smith Bldg. 30 Ionia Ave., S. W.
Grand Rapids 2, Michigan

Sprockets

Cullman Wheel Co., 1352-V Altgeld St., Chicago 14, Ill., has announced its Grip-master Sprocket System in



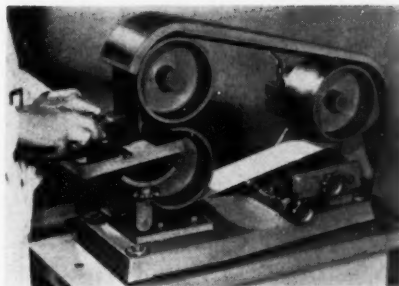
Cullman Grip-master
Sprockets

which quick-change roller-chain sprockets utilize different tapered-split bushings or split hubs to eliminate reborring when used on various applications. The sprockets are furnished in two series, a tapered-split bushing type and a split hub type, to meet most requirements.

Carbide Tool Sharpening Method

A unique method for final finishing of carbide tools has been jointly announced by Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn., and Hammond Machinery Builders, 1615 Douglas Ave., Kalamazoo, Mich. The method is based on the use of abrasive paper belts and a new-type belt machine. A two-step tool sharpening technique is employed, consisting of rough grinding on a standard-grit 60-silicon carbide wheel and finishing the sides and top of the carbide tip on the belt machine using a "Tri-M-Ite" Resinite abrasive belt ranging from grit 60 to 150, depending on the edge required. A $\frac{1}{16}$ -inch wide land, which is said to be at the desired clearance angle and flat, is finished from the cutting edge down.

The belt machine, designed jointly by the 3M and Hammond companies, is known as the Carbide Belt Finisher Model 454. Similar in design to the Hammond diamond wheel grinders, the machine employs the same type calibrated tilting table which swings out of the way for quick belt replacement without disturbing the angular setting. Other features of the machine are a tungsten carbide-faced platen for accurate flat surface

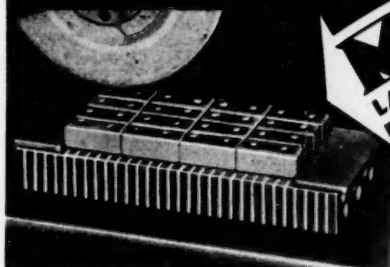


Carbide Belt Finisher Model 454 being used in sharpening carbide tool

finishing; a 10 x 7½-inch work table with side supports for sharpening angular tools; a positive abrasive belt tensioning device; and both angular and lateral belt tracking adjustment, permitting accurate and efficient belt control. The unit is powered by a ½-h.p. single or 3-phase motor for voltages of 110 to 440.

The 4 x 54-inch abrasive belt used with the machine for carbide tool sharpening is made with a special hard paper backing of high tensile strength and is coated

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- ELIMINATE HOLDING DEVICES



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PRECISION INSTRUMENTS

with a silicon carbide abrasive. The belt also features a "uni-caliper" splice for smooth operation. An especially-compounded "stick" coolant has been designed to produce maximum results in the tool sharpening method. According to the manufacturer, the belt machine can also be used for sharpening similar tools made from high-speed steel and other alloys and for other sharpening, chamfering, and surfacing operations. The machine is also said to be designed for wet grinding operations with conventional waterproof abrasive belts.

Special Solid Adjustable Tap

A special solid adjustable tap which is designed for tapping and chamfering standard pipe and drainage fittings in one operation has been announced by Landis Machine Co., Waynesboro, Pa. The tap is furnished in seven sizes for pipe ranging from 1¼ to 4 inches and is applicable to Pottstown, Cleveland, and other reversing-spindle machines. According to the manufacturer, the outstanding design feature of the tap is the incorporation of chamfering blades in the tap body and the use of removable

tap chasers. The tapping operation is performed on the forward portion of the machine cycle while the chamfer-

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Landis Special Solid Adjustable Tap

ing is completed on the reversing segment of the cycle, thus dividing the torque load for smooth cutting with minimum strain and supplying a chamfer without leave-off marks.

The tap is available with square or hexagon end drivers or cylindrical shanks. Models are available for either right or left-hand and straight or tapered tapping.

Indicator Measures Critical Dimensions

Designated as the "Airetest," an indicator which is designed for the precise measurement of critical dimensions normally encountered in toolroom operations has been announced by The Sheffield Corp., Dayton 1, Ohio. According to the manufacturer, the indicator, a super-sensitive air height gage, has adequate amplification and gives positive repeat readings when approached from the front, back, or either side. The indicator, it is claimed, may be located in a place most convenient to the operator, regardless of the position of the gaging stylus.

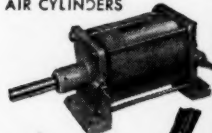
The instrument consists of a pickup arm mounted on a beam actuating an air jet connected to a 1,000-1 or 2,000-1 amplification Precisionaire gage. A screw is said to permit fine adjustment. The manufacturer states that other possible uses for the indicator may be found in static strain gages, in dynamic strain gages with a recording unit, as a center pickup unit in machine tools, and as an indicator for various types of lead testers and gear checkers. The unit, it is claimed, can also be used as a master testing device to accurately determine flatness,



Sheffield "Airetest" Indicator in use

parallelism, concentricity, and other geometrical features of parts resting on a surface plate, clamped in required relation to a surface of a plate, or rotated on precision centers or in V-blocks. The "pencil slim" design of the indicator is said to permit it to be used in holes, slots, and grooves.

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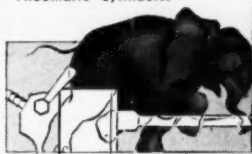
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Taper Attachment Is Designed for Standard Turret Lathes

Associated Engineers, Inc., Agawam, Mass., has announced the Dow Taper Attachment which is designed for use on a standard turret lathe, using the combined feeds of the hex turret and cross-slide.

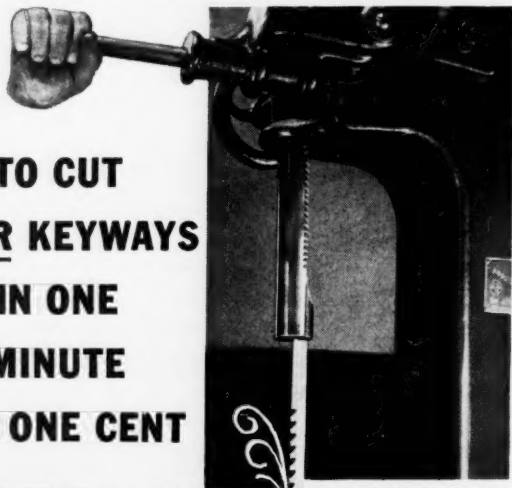
The attachment consists of two units; namely, a roller bracket which is mounted in the square tool turret or on the cross-slide and an adjustable cam which is mounted on a holder and fitted to the standard hex turret. The cam, it

is claimed, is so located as to allow it to contact the roller in the tool post. According to the manufacturer, the cam is infinitely adjustable, thus making the range of angles which can be cut by the attachment also infinite within the range of the machine.

The first step in turning tapers or angles is to select the cross-slide and hex feed which will most nearly produce the desired angle. The second step is to adjust the cam to compensate for the difference between the angle which the machine can produce and the angle to be cut. The practical minimum angle which

can be cut is approximately that which can be produced by combining the maximum longitudinal feed

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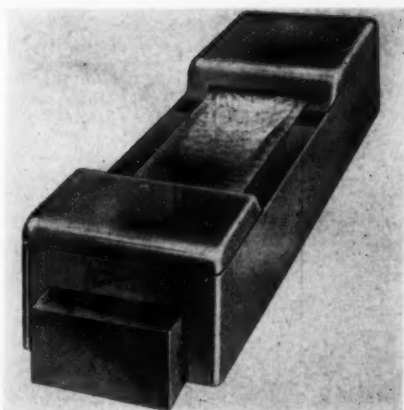
Dow Taper Attachment

of the hex turret with the minimum cross-slide feed. The maximum is said to be 90 degrees with the axis of the workpiece. When using the attachment, angular surfaces, it is claimed, can be machined internally or externally on either the periphery or face of the workpiece.

Unit Provides Automatic, Continuous Filtration of Water Soluble Coolants

Automatic, continuous filtration of water soluble coolants for individual grinders, hones, and other machine tools is said to be provided by a constant-vacuum endless-belt filter, designated as the "Vacu-matic," developed by the Industrial Filtration Division, U. S. Hoffman Machinery Corp., 219 Lamson St., Syracuse 6, N. Y. The filter is available in two models for flow rates of 20 and 40 gallons per minute.

When installed, used oil flows by gravity from the machine into the unit cabinet where a baffled distributor head spreads it evenly across an endless, moving filter belt especially woven of nylon, wool, and cotton fibers. A built-in vacuum pump produces a pressure differential in the chamber which the belt moves, the difference in pressure drawing coolant through the belt into the chamber from which it drains into a clean coolant sump. The coolant is then recirculated to the machine by a built-in coolant pump. Solid particles which remain on the belt are carried forward to the discharge end of the unit. A vibrator loosens the caked



Hoffman "Vacu-matic" Constant-Vacuum Endless-Belt Filter

residue, and the particles drop into a handy, removable tote box. The sludge is said to be dewatered and in powder-dry form when discharged into the tote box.

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Ivan Rahn, Factory Superintendent, is shown checking the surface with an auto-collimator.

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Weights 60,000 pounds, measures 20 feet long, 6 feet wide and 3 feet thick. 300 average size surface plates could be made from it.

The overall accuracy of the entire surface is .0015", every 6 foot square section is .0002" and every 2 foot square section is

accurate to .00005". This is as close to a theoretically perfect plane, over such a large surface, as man has yet attained.

Making the huge surface plate required new engineering developments and special equipment unique to the industry.

We are honored to have been selected to produce the world's largest and finest surface plate. It is a tribute to the "know-how" and skill of our craftsmen, acquired through ten years of granite plate research and production.

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636 N. WESTERN AVE., DAYTON 7, OHIO



Erick Model 675 Magna-Holder Floodlight

Portable Floodlight

Cullen Mfg. Co., 1318 Clark St., Racine 1, Wis., has introduced the Erick Model 675 Magna - Holder Floodlight which consists of a heavy-duty lamp socket and reflector, which are firmly mounted on an extension rod

that is attached to a magnetic base. The magnetic base contains permanent Alnico magnets exerting a 50-lb. pull, thus permitting the lamp to be attached to any round, flat, or angled ferrous surface. A ball socket arrangement is said to afford focusing of the light in any direction, and a holding screw locks the extension rod in position.

The unit is designed to accommodate bulbs up to 100 watts. The chrome-plated rod is 3½ inches long, and the light globe and magnetic base are finished in a hammered blue effect. The unit is supplied with six feet of oil-resistant cord.

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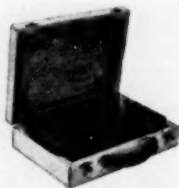
Its 120 pages are packed with useful cutting tool information . . . plus a valuable section of Engineering Data. Request your free copy on company letterhead. In *special* tooling problems, consult your nearby Gorham field engineer. His counsel is yours for the asking, and it's backed by Gorham's 35 years' experience in the design and production of fine cutting tools. Write for his name.

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WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne 4, Calif.



Portable Surface Plate

The Elcro Co., 738 Albany St., Dayton 8, Ohio, has announced the



Velsley Ultra-Flat Portable Granite Surface Plate

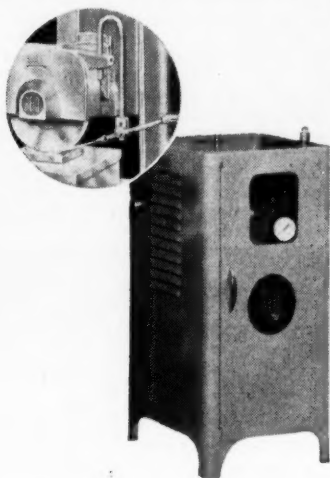
addition of an Ultra - Flat Portable Plate to its line of Velsley Granite Surface Plates. The portable plate measures 8 x 12 x 2½ inches and is of four-lip design. According to the manufacturer, the overall surface accuracy of the plate is twenty-five millionths of an inch.

The plate is supplied in a finished hardwood case which is ruggedly built and which can be furnished with a lock when

desired. The plate and case together weigh approximately 20 lb. The portable plate is available in either Velsay Black or Velsay Red Granite.

Cool Grinding Attachment Does Not Require Splash Guards

A cool grinding attachment which is designed to enable operators of toolroom grinders to perform wet grinding operations without the use of splash guards around the workpiece has been announced by Reid Brothers Co., Inc., Beverly, Mass. The attachment utilizes an atom-

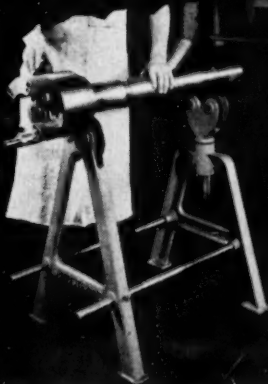


Reid Cool Grinding Attachment

ized spray, keeping the workpiece clearly visible at all times and eliminating a coolant flow. Rapidly-evaporating rust-resistant coolant is sprayed directly at the point of contact between the grinding wheel and the workpiece, preventing the coolant from spattering.

The attachment is a self-contained, 16 x 16 x 32-inch, portable cabinet which houses the coolant container and motor compressor. The unit is designed to operate from a 110-volt circuit. Pressure of the spray is said to be readily controlled by a valve on top of the cabinet. Casters may be attached to the unit for easy portability. According to the manufacturer, any commercial coolant which is soluble in water can be used in the attachment.

Balancing Tools for a Wide Range of Work



Here's a complete line of Balancing Tools which will save their cost quickly on balancing or truing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears, shafts, fly wheels, pulleys, etc. The standard sizes available are shown in capacity chart below.

CAPACITIES		
Swing	Between Standards	Weight Capacity
21 in.	20 in.	12 lbs.
21 in.	20 in.	800 lbs.
43 in.	29 in.	800 lbs.
43 in.	29 in.	2,000 lbs.
6 ft.	5 ft.	5,000 lbs.
8 ft.	8 ft.	10,000 lbs.
Any	Any	24,000 lbs.
43 in.	30 in.	800 lbs.

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**PRECISION MADE
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HEIGHT
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• Direct readings in
.001" from sur-
face plate to zero.

Easily adjustable
to compensate for
wear.

Supplied in wood-
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0-12" DIMENSIONS

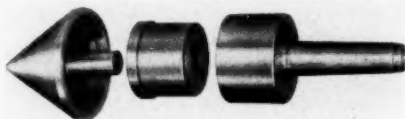
Measuring range 0-12"
Length of scribing needle . . . 2 3/4"
Size of foot plate 3 7/8" x 2 1/4" x 1-3/16"
Net weight 3 1/2 lbs. Gross weight 5 3/4 lbs.

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**Live Center Incorporates Pilot
Bearing Bushing Features**
Said to be especially adaptable to metal
spinning lathes, a live center incorpor-



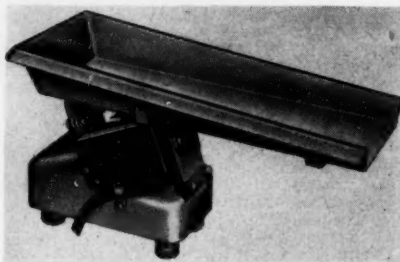
Jergens Live Center

ating the features of the Jergens pilot bearing bushing has been announced by J. G. Jergens Co., 11106 Avon Ave., Cleveland, Ohio. According to the manufacturer, the center is completely sealed against dirt and grit, requires no lubrication, and is adjustable for bearing wear. The center is said to be ruggedly constructed, thus making it suitable for taking heavy cuts with carbide tools. Tapered roller bearings are provided for smooth chatter-free operation, and minimum overhang affords rigidity.

The live center can be used on lathes, grinders, turret lathes, automatic lathes, and hobbing machines. The unit can be furnished with any type shank and nose. A wide range of interchangeable noses is available.

**Small Electromagnetic Vibratory
Feeder Has Maximum Feeding
Capacity of Two Tons Per Hour**

For problems involving low tonnage bulk materials handling and feeding, Syntrol Co., 309 Lexington Ave., Homer City, Pa., has announced a small electro-



Syntrol Model F-01 Electromagnetic Vibratory Feeder

magnetic vibratory feeder, designated as the Model F-01, which has a maximum feeding capacity of two tons per hour and which was designed to handle intermediary applications ranging between one and two tons per hour. According to the manufacturer, the electromagnetic design eliminates the use of any rotating, working parts, such as gears, cams, belts, chains, and so on. All action is confined to easily replaceable leaf springs.

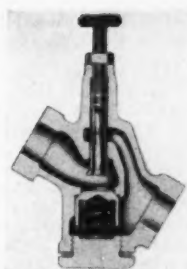
The regulation of the material flow out of the feeder is governed by a rheostat in the controller of the unit. Merely by turning the rheostat knob, the flow rate, it is claimed, may be increased from a trickle to a torrent. The unit weighs 48 lb. and is furnished complete with a controller.

Speed Control Valve

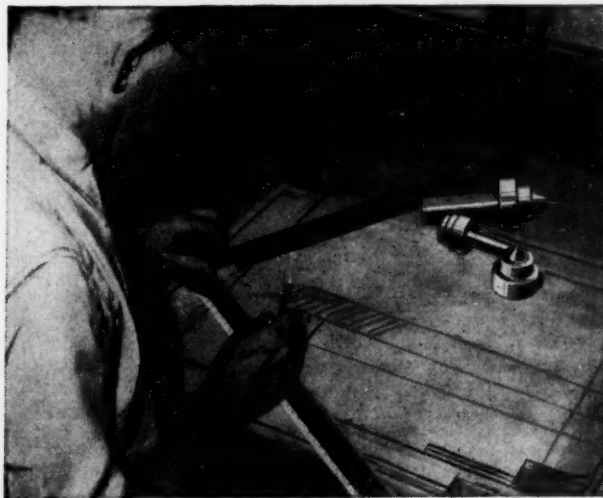
A speed control valve which, it is claimed, can be used wherever it is necessary to control the flow of air and which provides split-second timing of piston movement by positive control of air flow

has been announced by Ross Operating Valve Co., 120 E. Golden Gate, Detroit 3, Mich. The speed control valve can be mounted in any position between the operating valve and one or both ends of a cylinder to provide air flow adjustment. According to the manufacturer, the valve is easy to adjust, and the orifice controlling the flow can be adjusted with the stem from practically zero to wide open.

Construction of the valve is said to be simple and rugged, the poppet being the only moving part. The valve, it is claimed, can be disassembled without breaking the line connection. The unit is available with $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, and $1\frac{1}{4}$ -inch I.P.T.



Ross Speed Control Valve



Engineered Live Centers . . . A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse taper carried in stock.

STURDIMATIC
TOOL COMPANY
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Overhead Carrier Has Cantilever Arrangement

An overhead carrier with a cantilever arrangement that permits the unit to handle loads beyond the end of the crane on which the carrier operates has been developed by Cleveland Tramrail Division of The Cleveland Crane & Engineering Co., 6405 E. 282nd St., Wickliffe, Ohio. According to the manufacturer, the carrier is designed especially to take care of situations requiring the handling of materials in areas between roof-supporting pillars that cannot normally be covered by cranes and also for reaching



Cleveland Tramrail Overhead Carrier with cantilever arrangement in use

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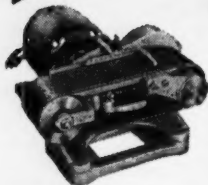
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through doorways. The extension feature of the carrier is said to permit the hoist to reach out as much as 2 feet 1 1/2 inches beyond the end of the crane. When it is necessary to travel the crane for some distance on its runway, the carrier is moved from the crane end to permit safe clearance of the columns.

The unit has a capacity of 1,500 lb. Other cantilever carriers of different load capacities and reach can be supplied.

"Solderforms" Find Use in Many Assemblies

"Solderforms," now available from Kester Solder Co., 4201 Wrightwood Ave., Chicago 39, Ill., comprise any desired tin-lead alloy, with or without a flux, and are made up in any required shape, such

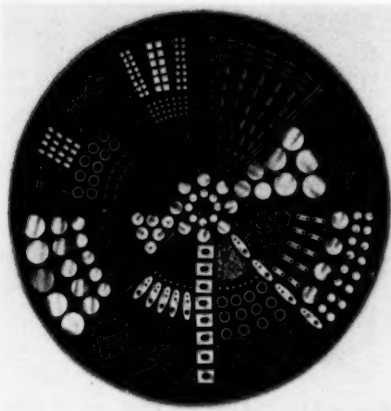
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Display of various shapes and sizes of Kester "Solderforms"

as ring, disc, pellet, washer, or spring. Other metal components can be included, if required, as in the case of soldering germanium diodes where silver is added to the basic alloy. Solderforms, it is claim-

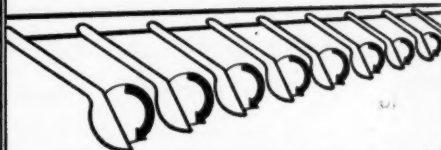
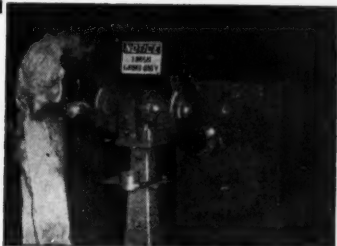
ed, can be employed with any of the usually accepted methods of applying solder, such as with flame, carbon resistance, oven, hot plate, induction heating, infrared, or a conventional soldering iron.

According to the manufacturer, literally hundreds of different sizes and shapes of Solderforms have been produced, including discs made from "paper thin" stock 0.0015 inch thick and rings with wire diameters from 0.020 to 0.250 inch. Solderforms, it is claimed, can be used in many assemblies, such as electronic components (relays, capacitors, resistors, and switches); gages; fire control parts; fuses; watch movements; badges and emblems; and cigarette lighters.

Motorized Lift Attachment for Hansford Die Handler

Designed for use on the Hansford Die Handler, a motorized lift attachment which, it is claimed, drives the upper platen of the die handler at the rate of 16.3 inches per minute has been announced by Hansford Mfg. Corp., 1239 University Ave., Rochester 7, N. Y. According to the manufacturer, fine adjustments

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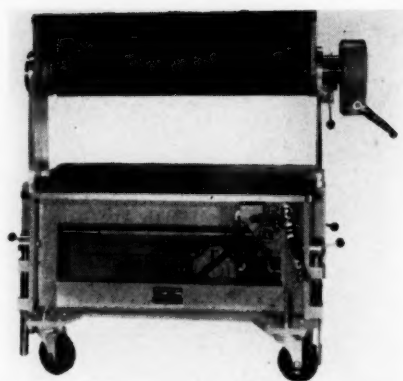
300 cfm to 10,000 cfm per unit (22 models) standard, pre-tested, available from stock.

Ask for catalog
605-2

No obligation.

can be made by means of a hand crank, and a safety precaution is afforded whereby it is necessary to disengage the hand crank before connecting the motorized lift. The motorized lift must also be de-energized before reconnecting the hand crank.

Sixteen feet of extension cord are provided for plugging the unit into a 110-volt a.c. supply. The unit can be supplied with J.I.C. controls that utilize an approved contactor box, in which case the motor operates on 440-volt 3-phase current and the controls operate on 110 volts. The attachment can be installed at the



Hansford Die Handler equipped with motorized lift attachment

factory or can be purchased and installed by the user. Mounting holes are provided in all standard models of the die handler.

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37 Farrand St. Bloomfield, N. J.

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for Increased
Productivity



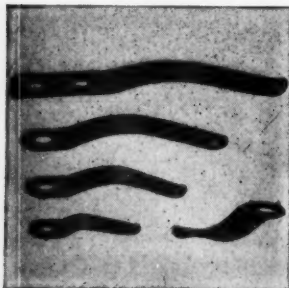
KENNAMETAL Inc.
LATROBE, PA.

**CEMENTED CARBIDE TOOLS,
BLANKS, MILLING CUTTERS**



Floating Holder Features "Du-Lite" Black Finish

Barnaby Mfg. Co., Inc., 70 Knowlton St., Bridgeport, Conn., has announced that its conventional floating holder is now finished in "Du-Lite" black to provide greater rust-resistant qualities and to assure longer active life. According to the manufacturer, the finishing process rounds off the microscopic spines and edges which are present even on the highly-polished bearing surfaces and, with its inherent oil-absorptive properties, reduces friction and prevents galling and scoring. The finish, it is claimed, is produced by a non-critical low-temperature process and becomes an integral part of the steel floating holder. Since



ALSCO Self-Locking Tool and Die Makers' Springs

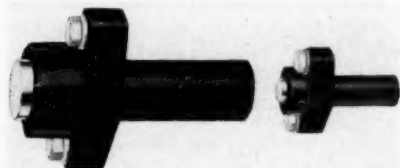
Tool and die shops, press rooms, machine shops, etc., will find these handy neat looking springs the answer to their flat spring requirements. They cost but a fraction of hand made springs. Made in four lengths from 1" to 2 3/4" and eight thicknesses from .010 to .032.

**IMMEDIATE SHIPMENT FROM STOCK.
SAMPLES AND PAMPHLETS UPON REQUEST.**

ALSCO COMPANY, 1770 Stone Road, Rochester 13, N. Y.

Du-Lite penetrates and is imposed at non-critical temperatures, there is said to be no change in the dimensions or physical characteristics of the holder. The finish, it is claimed, will not chip, peel, crack, or blister.

The floating holder is said to provide



Barnaby Floating Holders with "Du-Lite" black finish

a ready means for aligning drills, reamers, and similar tools with the work. The cutting tool is held in the head of the holder, either directly or by means of a bushing, and is securely clamped by a set screw. A hinged-shoe bushing blank is furnished with the holder which is available in sizes from $\frac{1}{2}$ to $1\frac{1}{4}$ -inch hole diameter.

Soluble Oil Developed for Wide Variety of Metal-Working Operations

Designated as "Shear-Speed," a highly versatile soluble oil which is designed for use as a coolant-lubricant in practically all types of metal cutting, grinding, and forming operations has been announced by Shear-Speed Chemical Products Division, Michigan Tool Co., 7125 E. McNichols Rd., Detroit 12, Mich. The oil is based on a multi-viscosity blend which is said to permit its use with a maximum range of speeds, feeds, and materials. An unusual feature of the coolant is its pastel blue color which minimizes eye strain of the machine operator, eliminating harsh glare which interferes with precision work on long production runs. The oil, it is claimed, retains its color in the machine but is easily washable from hands or clothing.

According to the manufacturer, advantages of the coolant include no rancidity or objectionable odor over long periods of use; a special additive which soothes and helps protect the hands; unusual stability over a wide range of temperatures and operating conditions; easy mixing; elimination of heavy film residue

Six Sizes Available

All Have POWER Feed for Facing!



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Model "D"

CHANDLER TOOL COMPANY
Muncie, Indiana

Chandler

COMBINED BORING & FACING TOOL HEADS

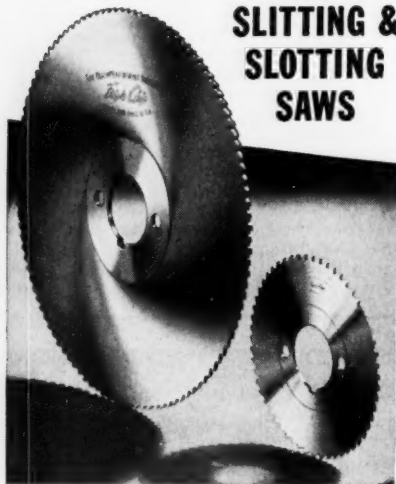
Duplex

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MERRYWEATHER**



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The Motch & Merryweather Triple-Chip Method clears the way to faster results in milling operations. Alternately ground paired high and low blade teeth form curling, self-clearing chips which relieve stresses and minimize breakage. Saws produce more work and more accurate work and "live longer".

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715 PENTON BUILDING
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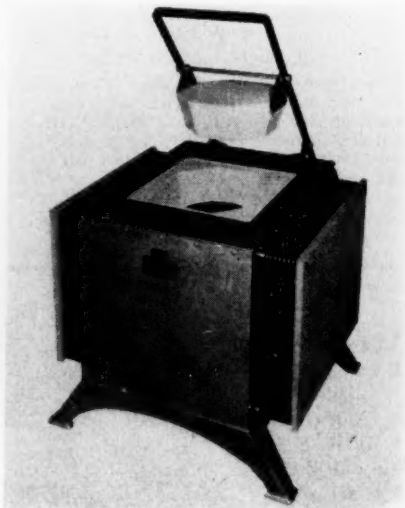
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PER CUT THAT COUNTS!**

Only
M & W builds
ALL 3:
CIRCULAR SAW
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on parts; anti-foaming and non-smoking under all normal operating conditions; and prevention of rusting of ferrous metals even in dilute emulsions of 200 to 1.

Electric Furnace Is Designed for Melting Small Crucible Charges

Designated as the Model YV, an electric furnace which is designed for laboratory and shop operations where it is desirable to melt small crucible charges of various metals and alloys has been announced by The Sentry Co., Foxboro, Mass. According to the manufacturer, the compact unit is easily accessible



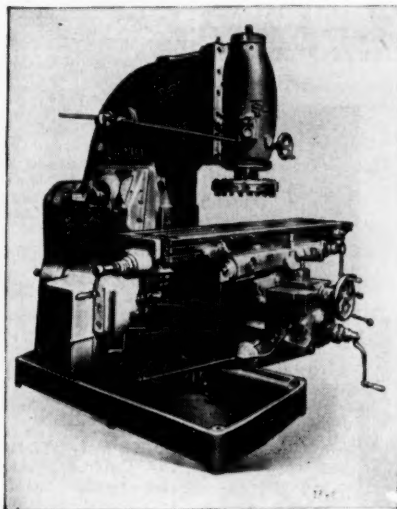
Sentry Model YV Electric Furnace

and will maintain temperatures of 2,500 deg. F. The furnace is equipped with a cylindrical muffle chamber to reduce the tendency of fumes, resulting from the melting operation, from entering the furnace heating chamber and adversely affecting heating element life. Provision is also made for venting fumes through the door when closed.

Heating is accomplished by four silicon-carbide rod-type resistors operating direct from a 220-volt supply. Accurate temperature control is said to be maintained by automatic pyrometer control equipment.

Milling Machine Is Available in Universal, Plain, and Vertical Types

The Somua No. 5 Heavy-Duty Milling Machine which is available in universal, plain, and vertical types is now being distributed by Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y. The dial-type machine is said to be rigidly constructed and features a 25-h.p. motor. An automatic cycle table control and dual control on the rear of the table are provided, and a single lever to control



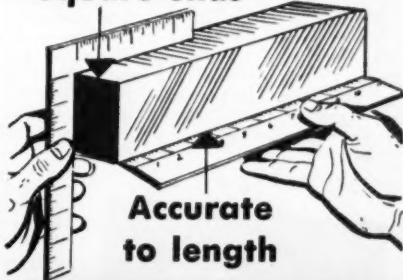
Somua No. 5 Heavy-Duty Vertical Milling Machine

both spindle rotation and automatic spindle speeds changes, hydraulic speeds change selector, mechanical feeds change selector, and independent automatic feeds (longitudinal, cross, and vertical) are incorporated in the machine. The machine has tapered anti-friction bearings, and the feed drive through bevel gears and shafts is protected by telescopic tubes.

Over-Running Clutch Can Operate at Speeds Exceeding 3,000 R.P.M.

Formsprag Co., 23601 Hoover Rd., Van Dyke, Mich., has announced a develop-

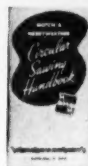
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Accurate to length



Ask for our Circular Sawing Handbook.



Segmental - 11" through 108" dia.
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Down with scrap! Up with usable production! Whatever the material or shape or size, Motch & Merryweather has a segmental or solid blade for the job. You get highest practical speeds, ends square and burrless, cut-off pieces meeting close tolerances. Resharpen repeatedly at low cost. Obtain Triple-Chip long life and economy.

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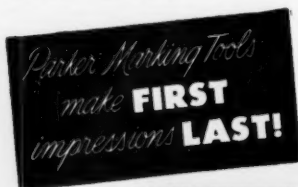


REMEMBER - IT'S THE COST PER CUT THAT COUNTS!

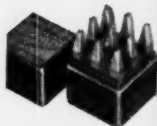
Only
Motch & Merryweather
ALL 3-
CHIPPING SAW
TAW BLADE
BLADE GRINDER

ment which is said to make it possible for an over-running clutch to operate at speeds exceeding 3,000 r.p.m. by means of a centrifugal throwout sprag assembly that eliminates any possible rubbing between the sprags and the inner race. The feature is available in the Formsprag All-Purpose Ball Bearing Clutch which is available in a standard model with eight variations.

Construction of the clutch consists of four basic parts; namely, the outer housing, the inner race, the full complement of sprags, and energizing springs. According to the manufacturer, the sprag principle provides an infinite number of gripping positions and eliminates backlash. Maximum torque capacity (for size and weight) and long life because of changing contact points are other advantages which are claimed for the



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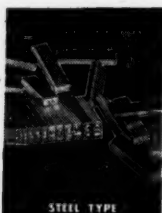
STEEL NUMBER SETS



STEEL LETTER SETS



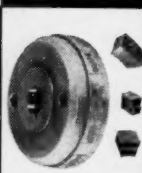
STEEL HAND MARKING DIES



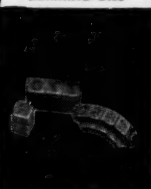
STEEL TYPE



TYPE HOLDERS



INSERT ROLL MARKING DIES



CODING TYPE



ROLL MARKING DIES

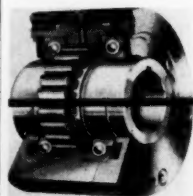


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Cutaway view of Formsprag All-Purpose Ball Bearing Clutch showing new design feature

sprag-type of clutch construction.

Plastic and Wooden-Handled Screw Drivers

A line of plastic and wooden-handled screw drivers has been introduced by The Billings & Spencer Co., Hartford, Conn. Each tool is drop forged from selected heat-treated steel, and the plastic handle is said to be shockproof, unbreakable, and impervious to oil and water. A special six-flute design, it is claimed, provides a comfortable non-slip grip. According to the manufacturer, the blade is imbedded in the plastic in such a manner

THE
PARKER
STAMP WORKS, INC.
MARKING DIE & MACHINERY DIV.
FRANKLIN AVENUE • HARTFORD, CONNECTICUT

by Parker

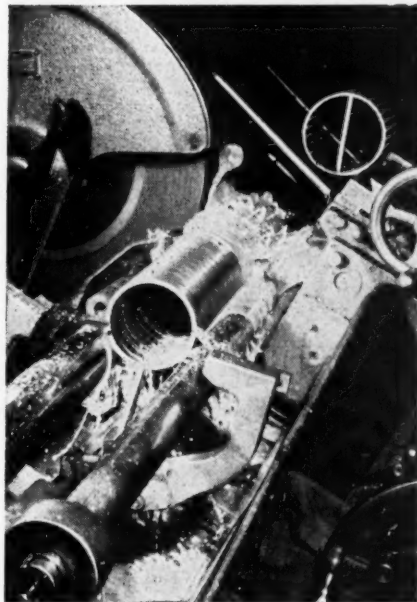
as to ensure a tight fit and to prevent the blade from turning within the handle. The plastic-handled screw driver is available in six patterns, including round blade, cabinet type, Phillips point, square blade, stubby, and pocket type. A heavy-duty model, known as the Billings Wrench Grip, is equipped with a hexagonal shoulder directly below the plastic handle. The hexagonal shoulder is said to provide for the ready application of a wrench when increased torque is required.

The wooden-handled screw driver is offered in four patterns which include common type, cabinet type, extra light, and extended shank. The extended-shank type features a one-piece construction with the shank extending all the way through the handle to terminate in a forged hex end, thus providing unusual resistance to torque strains. Blade lengths of the line range from 1½ to 12 inches, and blade tips are said to be accurately ground and squared to prevent slipping in screw slots.

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● To get the finish and production you want—at the lowest possible cost—start with a letter or phone call to your CARBORUNDUM distributor or salesman. Without obligation to you, he'll visit your plant and study every angle of your centerless grinding or lapping operation. Then, based on his wide experience in this field, he'll recommend the exact combination of CARBORUNDUM's grinding wheels and regulating wheels to meet your particular needs.

CARBORUNDUM offers a complete selection of proven grains and bonds for all types of centerless grinding. And CARBORUNDUM's regulating, or feed wheels are the standard of the industry—as they have been since this method of grinding was invented.



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Profile Tracing Attachment It Designed for Engine Lathes

Designated as the "Pro-Tracer," a simple, compact profile tracing attachment which, it is claimed, can be used on any engine lathe has been manufactured by Air Control Division, Lehigh Foundries, Inc., 1500 Lehigh Drive, Easton, Pa. According to the manufacturer, installation or removal takes only a few minutes, and no alterations to the lathe are necessary. To install the attachment, the tool post is removed, and a single bolt securely fastens the attachment to the compound in such a manner that it can be adjusted to any cutting angle. A second bolt secures the fully-adjustable template-hold-

ing bracket to the lathe bed. Full use of both cross feed and compound is said to be permitted at all times. Accurately-

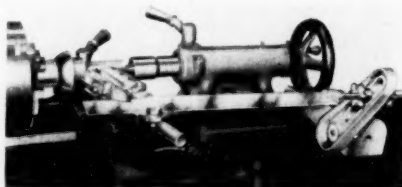


Illustration showing Lehigh "Pro-Tracer" Profile Tracing Attachment installed on an engine lathe

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Made in a range of sizes and types, to handle most any kind of machining operation, where vises are applicable. Write for circular, etc.

J. E. MARTIN MACHINE WORKS, Springfield, Ohio

ground $\frac{1}{8}$ x 2-inch wide gauge stock templates are recommended to guide the movement of the tracer slide, and template length is said to be limited only by the length of the lathe.

Boring i.d. contours can be turned by the same method as conventional o.d. turning, and a 90-degree step, it is claimed, can be cut in the direction of the feed. Turning 90-degree shoulders in the direction of the feed, or blending a shoulder with a radius is said to be possible on either i.d. or o. d. turning. Profile facing is accomplished, by turning the attachment at right angles to the spindle of the lathe.

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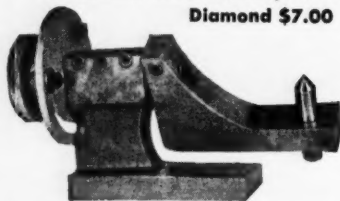
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Diamond \$7.00

ANGLE DRESSER \$44.00

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Hardened shaft—Bearing adjustable for wear. Diamond always perfectly centered. Easily set adjustable 180° stops.

10" Wheel size for DeALL and NORTON Grinders—\$44.00. Diamond \$7.00.

SPECIAL 20" Wheel Size \$110.00.

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SPERMAN METAL SPECIALTIES

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Ball Thrust Bearing. 24

Precision Ground Surfaces. Can be set very accurately with a Protractor or Sine Bar. Works underneath the wheel. Large bearing surfaces.

Accessory Set Extends Usefulness of Standard Gage Blocks

Webber Gage Co., 12899 Triskett Rd., Cleveland 11, Ohio, has announced an accessory set, designated as the No. 11, which is said to extend the usefulness of Webber standard gage blocks by permitting the gage blocks to be used as a tool, as well as a standard of measurement. The set consists of four gage block clamps with capacities of 12, 6½, 4, and 1½ inches, respectively; a pair of 0.250-inch straight jaws; a pair of 0.250-inch half-round jaws; a center point; a scriber; and a base block. The accessories, it



Illustration showing how Webber Standard Gage Block Accessory Set No. 11 is used to extend usefulness of gage blocks

is claimed, can be combined with the blocks into a variety of precision gages for layout and inspection work. The gage blocks can also be combined into build-ups to serve as snap gages, ring gages, height gages, calipers, and scribers for every dimension under 12 inches.

According to the manufacturer, the accessory set is not to be confused with heavy-duty blocks and accessories whose oversized gage blocks have infinite ranges. The standard accessory set is available separately or can be obtained in conjunction with steel or carbide 84, 43, and 38 blocks sets.

Auto-Collimator Measures Angles, Parallelism, and Surface Quality

Designated as the Model 4, a jackknife auto-collimator which is designed for the

KIPP

Air Grinders



- **FASTER SPEEDS**
- **BETTER RESULTS**
- **LOW PRICES**

MODEL JA
50,000 R.P.M.
 Weight 12 ounces; length
 6½ inches; chuck size
 ⅜ inch. Wheel guard re-
 moved for better illustration.

\$42

IN U.S.A.

THEY GRIND—NOT JUST RUB!

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind . . . not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

MADISON-KIPP CORP.

208 Waubesa St., Madison, Wis., U.S.A.

Write for KIPP Air Tool Catalog at 3006

precise measurement of angles, parallelism, and surface quality of metals, plastic, or glass has been announced by The



Perkin-Elmer Model 4
Jackknife Auto-Collimator

Perkin-Elmer Corp., Norwalk, Conn. According to the manufacturer, the instrument can be used in routine machine and optical shop operations with an accuracy greater than 6 seconds (0.002 degree). The collimator can be used directly against any surface which reflects a beam of light. The unit, it is claimed, is ideal

for measuring the parallelism of two surfaces of transparent or opaque objects, angular measurements, go and no-go surface quality gaging, index of refraction, and focal length measurements.

The jackknife collimator is said to feature a folded optical path, thus permitting all components of the instrument to be housed in a single rugged casting. The

work table incorporates leveling controls and is directly in front of the operator for easy operation. The standard eyepiece of the instrument has a focal length of 12 mm., giving a magnification of 80X. Other eyepieces for reduced magnification and micrometric focusing are available.

Universal Table Is Designed for Combination Angular and Straight-Line Cuts

A universal table which is designed for combination angular and straight-line cuts on shapers, milling machines, and grinders has been announced by South Bend Lathe Works, South Bend 22, Ind. When used on a drill press, the table is said to accurately space drilled holes and by chucking an end mill, the drill press converts to a light milling machine. By attaching the table to the faceplate of a lathe, spaced holes for jigs and die blocks, it is claimed, can be bored with micrometer accuracy.

The upper and lower tables of the accessory are identical, and the upper table may be removed when it is not needed. Both the upper and lower slides have a

WHITNEY - JENSEN

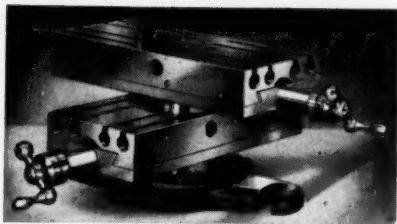
METAL WORKING TOOLS

FOR 43 YEARS

**NOS. 10-11-12
BALL BEARING
PUNCHES**

Punches with portability and power combined. Because of ball bearing screw principle, each develops over 14,000 lbs. punching pressure. No. 11 is identical to No. 10 except for tubular handles which are used for carrying extra punches and dies. No. 12 has higher and deeper throat for punching channels. Bases are available for fixed-position punching. Capacity (all models) $\frac{3}{8}$ " through $\frac{1}{4}$ "

WHITNEY METAL TOOL COMPANY • 110 FORBES STREET, ROCKFORD, ILLINOIS



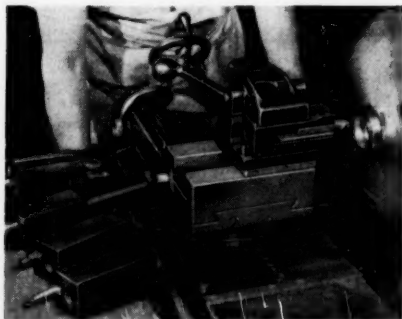
South Bend Universal Table

maximum travel of 4 inches and revolve on graduated swivels through 360 degrees. The slides may be used without graduated swivels to reduce height if desired. Two feed screws equipped with micrometer collars reading in thousandths of an inch are utilized. Measuring 4 x 8½ inches, each precision-ground work table has four slots for clamp bolts. Full length take-up gibs on the dovetails are said to ensure long-life accuracy of the table.

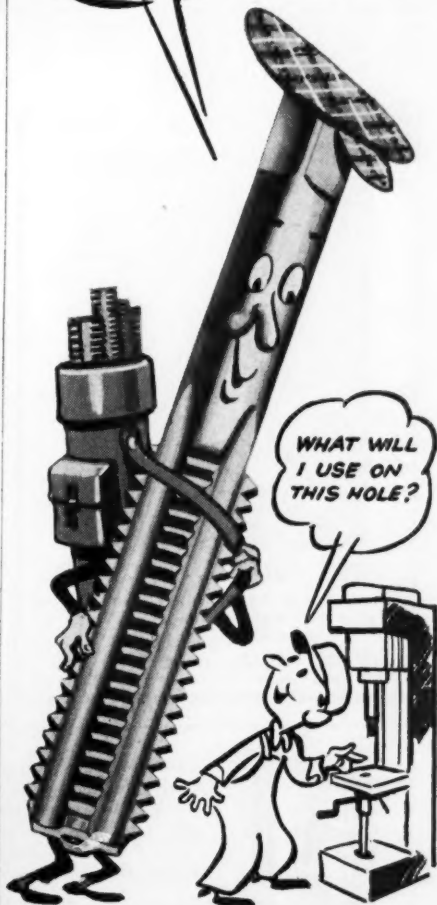
Master Tool Post and Toolholders Reduce Set-Up Time

A master post, which is said to incorporate a quick-grip and quick-release feature that enables cutting tools to be exchanged rapidly has been developed by Bakewell Products, 1128 Mission St., South Pasadena, Calif. Securing the heavy-duty tool post to a lathe is said to be easily accomplished by means of a T-block which fits into the T-slot of the lathe compound or carriage. The bar-type toolholders furnished with the unit are held in the tool post by hardened and ground jaws. Rotating the operating han-

Bakewell Master Tool Post and Toolholders



**YOU CAN MAKE EVERY
HOLE IN PAR WITH A
WOOD AND SPENCER TAP**



The Wood & Spencer Company
Cleveland 3, Ohio

dle clockwise releases the pressure of the jaws, and further rotation engages a cam which causes the jaws to open fully, thus permitting quick changing of toolholders. In tightening the toolholder, cam action causes the jaws to quickly grip the toolholder, and then the thread action starts.

The tool post is cast of high-strength alloy steel, and the holders are made of 1018 cold-rolled unhardened steel. Both the tool post and holders are rust-proofed. Partially-machined cold-rolled blank bars are also available for making special cutting tools. Drill chucks, offset

holders, box tools, knurlers, and other tools can be brazed or welded to the bars. The tool post is available in three sizes to fit practically all lathes.

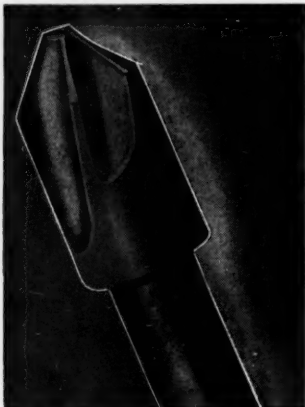
Combination Keyway Broach Kit

To cover all hole sizes in $\frac{1}{8}$ -inch increments, The duMont Corp., Greenfield, Mass., has introduced the "Minute Man" No. 1-1A Combination Keyway Broach Kit which provide broaches and bushings for standard width keyways in 18 bore diameters conforming to American key standards. According to the manufacturer, by interchanging broaches and bushings, 36 different combinations of keyways can be cut. The addition of the kit in both carton and high-speed steel is said to provide 25 standard "Minute Man" keyway broach kits from which to select to meet specific requirements.



duMont "Minute Man" No. 1-1A Combination Keyway Broach Kit

SOLD THRU LEADING SUPPLY HOUSES



GROBET CHATTERLESS COUNTERSINKS

Six staggered cutting edges give shearing cut that eliminates all chatter.

Send for catalog BC1.

GROBET FILE CO. of AMERICA, INC.
421 Canal Street N. Y. 13, N. Y.

Electric Rotary Hearth Furnace Operates at Temperatures up to 2,500 Deg. F.

Designed to operate continuously at temperatures up to 2,500 deg. F., an electric rotary hearth furnace which has a rating of 260 kw. with a capacity of 1,500 lb. per hour has been announced by Hevi Duty Electric Co., Milwaukee 1, Wis. Ac-



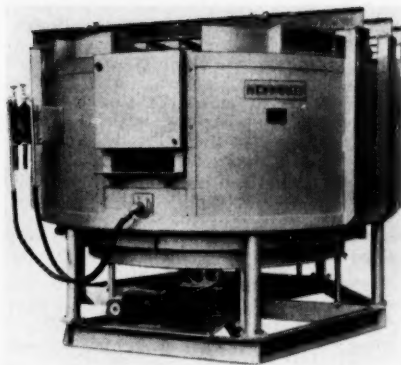
Variable Speed Pulleys provide a most efficient and inexpensive speed control for all types of machinery. A patented feature of Hi-Lo Pulleys is the cam action within the pulley which automatically regulates belt tension actually required to carry the load. Hi-Lo Pulleys maintain constant speed at any speed setting. Hi-Lo Pulleys use standard V belts, obtainable at any supply house.

WRITE FOR COMPLETE INFORMATION

EQUIPMENT ENGINEERING CO.

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MINNEAPOLIS 7, MINN.



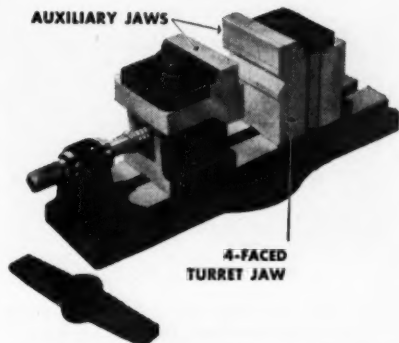
Hevi Duty Electric Rotary Hearth Furnace

cording to the manufacturer, the furnace utilizes silicon-carbide rod-type heating elements which are arranged vertically and can be easily replaced even while the furnace is hot. A protective atmosphere is said to be used to maintain a bright surface during hardening and to prevent the decarburization of special high-temperature alloys. The furnace incorporates a variable-speed drive mechanism which, it is claimed, can be adjusted for controlling the speed of the hearth.

A process of continuous operation can be obtained by placing cold parts on the 7-foot diameter hearth, which is slowly rotated, and removing the heated workpieces as they pass the door opening. The door opening is 18 inches wide and adjustable between 6 and 10 inches in height. A water-cooled face is provided over the chamber opening. The furnace is available in various sizes.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.

SAVE SET-UP TIME



Holds round, oval, square, octagonal, rectangular, flat and angular work without special jigs

Both men and machines put more time on productive work when Brown Vises are used because turret jaw faces and auxiliary jaws eliminate time wasted in "riggin" set-ups.

Quality is improved because husky vise (it weighs 96 lbs.) holds work tight. Jaws open to 9 1/2 inches. Clamping flange surrounds entire vise.

For complete specifications and prices write for Bulletin 23Y, Brown Engineering Co., 120 N. 3rd Street, Reading, Pa.

BROWN

UTILITY

VICES

NEW SHOP LITERATURE

Disc Clutches. The Conway Clutch Co., 2745 Colerain Ave., Cincinnati 25, Ohio, has issued two two-color catalogs on its



disc clutches for use wherever power must be transmitted. Catalog MGT-A is a 20-page catalog fully describing and illustrating Conway's gear tooth drive

disc clutch in medium sizes. Information on features, specification tables, dimensional drawings, and a component parts list, as well as data on shifter collars and yokes, keyways, collars, and special clutches, are included. Catalog P-25 is a 16-page catalog dealing with the company's stud drive disc clutches and contains helpful data on features, dimensional drawings, specification tables, and parts prices. Information on shifter collars and yokes, keyways, couplings, and various typical applications is also provided.

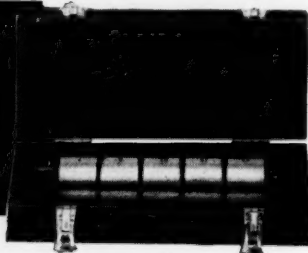
Decimal Equivalent Calendar Chart. Dayton Rogers Mfg. Co., Minneapolis 7, Minn., has released a two-color decimal equivalent calendar chart dating from July 1, 1953, to July 1, 1954.

Gears. A 20-page illustrated catalog released by The Earle Gear & Machine Co., 4707 Stenton Ave., Philadelphia 44, Pa., includes text material and blueprint dimension drawings of spur, bevel, helical, and worm gears. Ordering information, helpful formulae, and data on non-metallic gears, racks, sheaves, sprockets, and special machinery are included.

Check Surface Roughness Waviness and Lay INSTANTLY ... Right At The Machine



With
**ACME'S
ROUGHNESS
COMPARISON
SPECIMENS**



Available in groups of 3, 5 and 8 specimens. Low cost.

Consists of various surface specimens, individually finished to definite micro-inch readings, grouped together in one handy comparison bar. Merely hold bar opposite work for fast, visual comparison check of surface roughness, waviness and lay.

**ACME
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Mfr's. of Drill Jig & Fixture Bushings
212 N. Laflin St. Chicago 7, Illinois

THE SERVICE SHOP TO INDUSTRY FOR OVER A QUARTER CENTURY

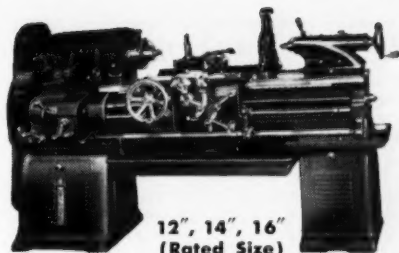
Honing. To help solve production problems on internal and external diameters, Sunnen Products Co., 7900 Manchester Ave., St. Louis 17, Mo., has issued a series of booklets on honing. The booklets available are No. 50, Sunnen Honing Machines; No. 51, Sunnen Portable Cylinder Hones; No. 505, Sunnen Honing Supplies and Accessories; No. 57, Sunnen Portable Honing; No. 55, Sunnen Toolroom Honing; No. 58, Sunnen External Hones; and No. 60, Sunnen Honing Case Histories.

Flexible Metal Hose. A six-page two-color bulletin (No. CMH-122R) released by Flexonics Corp., 1373 S. Third Ave., Maywood, Ill., describes and illustrates its line of CMH Flexible Metal Hose for handling various types of liquids, gases, solids, and semi-solids. Common flexible hose installations are shown, as well as the wide range of hose types and assemblies available. A handy application chart is included.

Radial Drilling Machines. A four-page two-color catalog (No. 573) released by Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., fully describes and illustrates the GSP Radial Drilling Machine which is available in various models for high precision work. Complete specifications for each model are provided.

Header Die Nibs. A nine-page manual (No. D-131) released by Carboloy Department of General Electric Co., 11143 E. 8 Mile Rd., Detroit 32, Mich., tells how to drill, assemble, and finish series HN rough-cored header die nibs employing grade 190 tungsten carbide. Besides outlining advantages and applications of grade 190 tungsten carbide, the manual includes information on nib standards, heading die design, and shop equipment, as well as other data for preparing nibs and header die casings.

Nibblers, Shears, Rod Cutters, Punches, Vises, and Fixture Locks. Heinrich Tools, Inc., Dept. 112-D, Racine, Wis., has released a two-color folder containing data sheets on its line of "Handnib" hand-operated nibblers, shears, rod cutters, and punches; "Grip-Master" screwless drill press vises; "Handy" screw-type drill press vises; and "Grip-Master" screwless fixture locks. Specifications and a complete price list are included in the folder.



12", 14", 16"
(Rated Size)

Engine and Toolroom Lathes

For
Dependable Accuracy!
BRADFORD
Metalmaster
LATHES

BRADFORD Metalmaster Geared Head Lathes have earned an enviable reputation throughout the years for high efficiency and dependable accuracy. But today's new Metalmaster is even finer! Built to the most exacting standards of workmanship, and of the finest materials and components, these new Metalmaster Lathes are equipped with many outstanding features.

POWER for Your Job: 2 HP to 10 HP

SPEEDS for Your Job: 16 RPM min. to 1000 RPM max.

FEED: 72 — .00072 to .1780

THREAD Range: 1½ to 368, including 11½ and 27 without extra gearing

DELIVERIES: 30 days, subject to prior sale.

*Let our Engineers solve your
lathe problems.*

Write for bulletin 179.



**THE BRADFORD
MACHINE TOOL CO.**

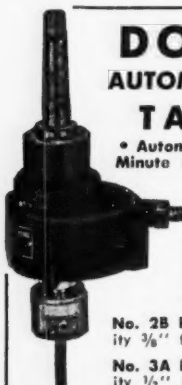
658 EVANS ST.
CINCINNATI, OHIO

Precision Since 1840

Carbide Blanks, Tools, and Toolholder Inserts. A 56-page carbide catalog (No. VR-441) issued by Vascoloy-Ramet Corp., Waukegan, Ill., describes its complete line of blanks, tools, and toolholder inserts and includes 12 pages of technical information on carbide and its uses, included with each item are illustrations, detailed line drawings showing dimensions and angles, short descriptive captions, sketches showing applications, and complete ordering information. The technical data section includes brazing information; data on chip breakers and chip control; cutting speed and horsepower

table; information on turning stainless steel and causes for tool failure; and grade table covering nine V-R standard tool grades.

Magnetic Chucks. A six-page two-color folder released by Sundstrand Magnetic Products Co., Division of Sundstrand Machine Tool Co., 1020 9th St., Rockford, Ill., fully describes and illustrates its "Power-Grip" Magnetic Chucks for production machining operations. Information on the use of a magnetic chuck for production milling, production grinding, and general grinding operations is included. A technical data sheet and ordering instructions are also provided.



DORMAN AUTOMATIC REVERSE TAPPERS

- Automatic Torque Control, One Minute to Adjust, Prevents Tap Breakage, Operator Need Not Be Skilled.
- WIDE RANGE TAP CAPACITY.

No. 1A FRICTION DRIVE TAPPER — capacity No. 2-56 to 3/8" in Steel — 1/2" in Aluminum.

No. 2B POSITIVE TAPPER — capacity 3/8" to 7/8" in Steel.

No. 3A POSITIVE TAPPER — capacity 1/2" to 1 1/4" in Steel — 1/2" to 3/4" Pipe Taps.

No. 4A TAPPER — capacity 3/4" to 2" in Steel including Pipe Taps.

- PRODUCTION THREADERS with Round Split . . . Button . . . Acorn Dies.

Priced from
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**IMMEDIATE
DELIVERY**

THRIFTMASTER PRODUCTS CORPORATION

Division of Thomson Industries, Inc.

1034 N. PLUM STREET, LANCASTER, PA.

STANDARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER DRILLHEADS

Thread Milling and Thread Milling Cutters. Detroit Tap & Tool Co., 8615 E. 8 Mile Rd., Base Line, Mich., has issued a two-color illustrated manual (D-52) which provides complete technical information on thread milling, speeds and feeds, maintenance, inspection and tolerances, and milling cutter types, as well as catalog type data on standard blanks carried in stock, how-to-order instructions, and so on. Tables listing correct peripheral speeds for milling different materials under different work conditions and information on methods for determining cutting speeds and feeds are also provided in the manual.

Sump Vacuum Cleaning Equipment. A four-page two-color bulletin (No. 130-C) published by The Spencer Turbine Co., Hartford 6, Conn., fully describes and illustrates its sump vacuum cleaning equipment which can pick up liquids at the rate of 40 gallons per minute with a tank capacity of 120 gallons. Line drawings and specifications are included.

THOSE WHO KNOW BUY

1 drop to 450 G.P.H. of Water Soluble Coolant

MODEL 2-SCS

All Hycon Pump with Stainless Steel Shaft . . . 1/35 H.P. Single Phase, Fan Cooled Motor, 5 Gal. Welded Steel Tank, (Baked Enamel), Removable Inner Container, 6 ft. Flexible Steel Tubing, Flow Control Valve, Cord and Plug, Shpg. wt. 30 lbs. Height only 9 1/2"



F.O.B. **\$54.50**

Gelber COOLANT PUMPS

BANTAM MODEL 5GC
All Bronze, Centrifugal "Friction" Free Pump, 1/30 H.P. Single Phase, Continuous Duty Motor, 5 Gal. Tank, 6 ft. Koroseal Tubing, Flow Control Switch, Conduit Box, Plug and Cord, Removable Strainer. Shp wt. 18 lbs.



F.O.B. **\$49.50**

Send for FREE CATALOG • **GELBER CO.** 162 N. Clinton St. Chicago 6, Ill.

Hardness Tester. Clark Instrument Inc., 10204 Ford Rd., Dearborn, Mich., has published a booklet which contains complete data on hardness testing. The booklet utilizes simple, easy-to-read text and numerous illustrations showing the equipment and procedure for fast and accurate hardness testing of ferrous and non-ferrous materials.

Safety Marking Tools. M. E. Cunningham Co., 1051 Chateau St., Pittsburgh 33, Pa., has issued a catalog listing over 100 safety marking tools. Each tool is concisely described for easy selection of the proper tool for every marking purpose.

Cutting Edge Gage and Circular Form Tools. Two pieces of literature covering the "Scribe-Chek" Cutting Edge Gage, which provides a simple, accurate method for sharpening tools, and standard circular form tools for performing a wide variety of operations have been released by Somma Tool Co., Inc., 19 Brown St., Waterbury, Conn. Dimensional drawings and specifications of the form tools are included.

Chucks. Horton Chuck Division of The Horton & Son Co., Windsor Locks, Conn., has issued a catalog (No. E-100) which has been designed to simplify the specifying and buying of Horton chucks. The features of the catalog include a visual reference index for quick location of the type of chuck wanted; sectionalization of each type of chuck, together with corresponding jaws and parts; and complete illustrations and dimensional drawings of all chucks, jaws, and parts for ready identification. Chucks listed include independent, universal, combination, light-duty, and two-jaw, as well as faceplate and boring-mill jaws.

"Cone-Drive Gears at Work in Materials Handling" is the title of an eight-page two-color illustrated brochure available from Cone-Drive Gears Division, Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Fourteen typical materials handling equipment applications of Cone-Drive double-enveloping worm gear sets and speed reducers are fully described. The applications include hoists, cranes, winches, and conveyors for many types of industry. Major advantages of Cone-Drive worm gear sets and speed reducers are discussed in the brochure.

June, 1953

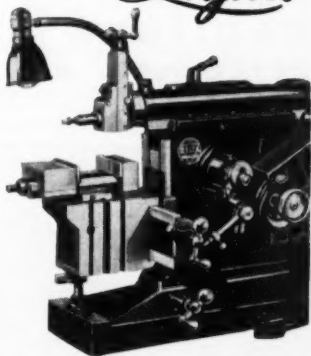


SHAPER OPERATORS

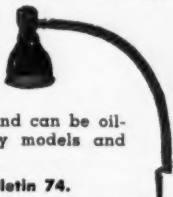
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WORK BETTER

WITH HELP FROM

VIMCO *Lights*



Vimco lights give on-the-spot lighting that no general plant lighting can possibly provide for close machining operations. Inaccuracies . . . injuries . . . slowdowns . . . are prevented in many instances when you eliminate the major source of worker fatigue—eye-strain. Vimco lights can be easily installed. Their movable arm stays put and can be oil-proofed if desired. Many models and designs available.



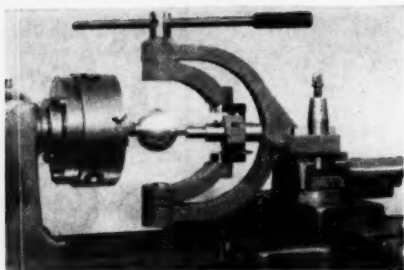
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VIMCO MFG. CO., Inc.

SINCE 1919

111 Brayton Street

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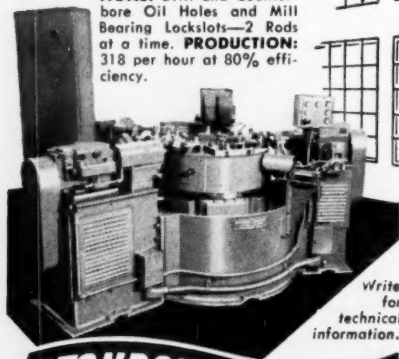
Convex, Concave or Ball

The accurate short cut for turning any radius. Adaptable to any lathe. Write for details. Territories available for responsible agents or distributors.

RADITURN DIV.
RETCO MFG. & SALES
BOX 13 FRANKFORT, IND.

No. S.O. 4612: 4-Way, 5-Station, Hydraulic Drilling, Counterboring, and Milling Machine equipped with a 36" diameter Hydraulic Index Table. All units are electrically interlocked for control of cycle. **PART:** Connecting Rod. **OPERATIONS:** Drill and Counter-

bore Oil Holes and Mill Bearing Locks—2 Rods at a time. **PRODUCTION:** 318 per hour at 80% efficiency.



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for
technical
information.

STANDARD MACHINE AND TOOL CO., LTD.
—U.S.A. Sales Representative: Arnold J. Werner Co., WINDSOR, ONT.

New Center Bldg., Detroit 2, Michigan

"Wet Grinding Saves Diamonds" is the title of a brochure released by Stadoil Mfg. Co., El Monte 3, Calif. The brochure is a reprint of an article which recently appeared in a technical magazine and is to be of interest to all shops using diamond wheels and laps.

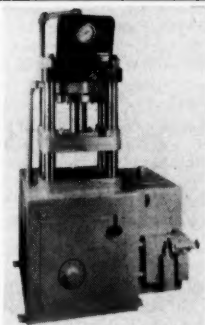
Free-Machining Prehardened Alloy Steel. A four-page two-color illustrated brochure released by United States Steel Supply Division, United States Steel Corp., 208 S. LaSalle St., Chicago 4, Ill., provides information about its Carillo FC, a free-machining grade of prehardened alloy steel. The brochure explains typical uses and savings which can be realized and also provides information on actual users' experiences.

Bricks, Sticks, and Stones. Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa., has released an eight-page two-color catalog (ESA-23) which contains illustrations and descriptive data concerning all its standard sizes and shapes of abrasive rubbing bricks, abrasive sticks, dresser sticks, scythe stones, jointer stones, sharpening stones, and specialty stones. Items are specified by simple catalog number for easy identification and ordering.

Dripproof Induction Motors. A six-page two-color bulletin (No. RS-2) issued by The Lima Electric Motor Co., Dept. 126, 160 Findlay Rd., Lima, Ohio, fully describes and illustrates its line of dripproof induction motors. Included in the bulletin are speed-torque curves, frame number charts, and dimensions and specifications for motors from 1/4 to 150 h.p., as well as complete descriptions of variations for optional-mounting and special-purpose applications.

Screws, Nuts, Washers, Jig Feet, and Bolts. Northwestern Tool & Engineering Co., 119 Hollier Ave., Dayton 3, Ohio, has released a catalog (No. 21) which describes over 300 tools, including socket head type shoulder screws; small and tiny sizes of press type jig feet; heavy nuts and washers from 1/4 through 1 inch; National Coarse and National Fine flanged nuts; spherical flanged nuts and washers 1/4 through 1 inch; and long sizes of latch bolts, jig feet, and quarter-turn screws.

HYDRAULIC PRESSES



MODEL 23

no valves to disassemble; cut out unsightly piping and valves. Write for 36 page standard press catalog or submit specifications for special presses.

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CLIFTON HYDRAULIC PRESS CO.

299 Allwood Road

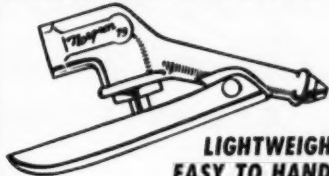
Clifton, N. J.

with the new
**Exclusive
UNITROL**



Reduce maintenance problems and costs; no broken lines—

NORGREN BLOW GUNS



**LIGHTWEIGHT,
EASY TO HANDLE**

Simple, economical means of removing metal chips, dust and other undesirable matter from parts, machinery, etc. Control of air from puff to blast.

Write for catalog sheet 476, describing 1/4", 3/8" and 1/2" models...also patented Norgren Flex-tip Blow Gun.

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Norgren®
C. A. CO.

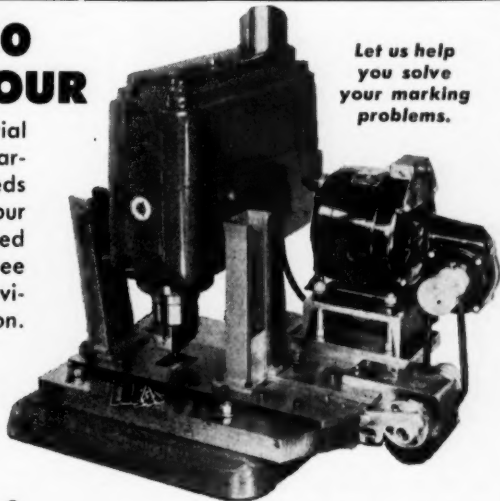
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Valves • Filters • Regulators
Lubricators • Hose Assemblies

MARK 10,000 TAGS PER HOUR

To automatically mark serial numbers and constant characters on name tags at speeds as high as 10,000 per hour use the Automark High Speed Marking Machine. It has three automatic speeds and provision for manual operation.

Just load the hopper and press the starting switch... the specially designed slide fixture automatically feeds the tags under the marking head and into the unloading chute for easy removal.



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your marking
problems.

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BOYAR-SCHULTZ

Precision-made
**ALLOY STEEL
T-SLOT
BOLTS**



**FOR MAXIMUM EFFICIENCY
and PROLONGED MACHINE LIFE**

It does not take long to ruin the accuracy of costly machine tools when poorly made, soft steel bolts of ordinary manufacture are used.

Boyar-Schultz T-SLOT Bolts are precision made with heads at right angle to bodies, carefully machined to present a broad, flat surface to the upper surface of the T-slots. They are made from alloy steel forgings, heat treated for maximum properties and are tough and hard. Threads, class 3 fit will not easily strip or distort. Special Nuts and Washers are specially made to give best results with Boyar-Schultz T-SLOT Bolts.

When compared with refinishing and truing the bed of a machine tool, the cost of GOOD bolts is trifling. *Write for Free Catalog.*

BOYAR-SCHULTZ CORPORATION
2120 Walnut Street, Chicago 12, Ill.

Self-Aligning Spherical Roller Bearings. A 28-page illustrated bulletin (No. 200-C) issued by Bantam Bearings Division of The Torrington Co., South Bend 21, Ind., fully describes its line of self-aligning spherical roller bearings. The bulletin includes a spherical roller bearing width tolerance chart; complete thread, locknut, and lockwasher data; an interchangeability chart; and special bearing pictures; and has been organized for easy reference particularly where adapter type assemblies are concerned. Engineering data, such as life expectancy, capacity ratings, life factors, installation and service factors, speed data, loads, and so on, are also provided.

Roller Gear Drive. Ferguson Machine & Tool Co., Inc., P. O. Box 191, St. Louis 21, Mo., has released three bulletins, (Nos. 101, 102, and 103) pertaining to its roller gear drive for indexing purposes. The bulletins explain the characteristics of the drive, how to determine the type of drive necessary for individual operating requirements, and how to select the proper standard drive for a particular installation.

Precision Boring Machines. A 16-page two-color bulletin (No. 31205) released by Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich., fully describes and illustrates its line of precision boring machines for straight and taper boring and turning, contour boring and turning, grooving and recessing, facing, counter-boring, chamfering, and combinations of these operations. Data on features and complete specifications are included.

"Broaching Practice" is the title of an 80-page two-color book released by National Broach & Machine Co., Detroit, Mich., that contains usable information for the production engineer and shop man. The text reflects the experience of Red Ring engineers in broaching. Chapter headings include applications and limitations of broaching; types of broaching; broach terms defined; broach cutting action; broachability of materials; broach design and manufacture; pullers, faceplates, holders, and inserts; information needed to design, manufacture, and quote broaches; broaching fixtures; handling and maintenance of broaches; setting up the machine; cutting fluids for broaches; broaching troubles and how to correct them; case studies; and Red Ring gear finishing and inspection equipment.

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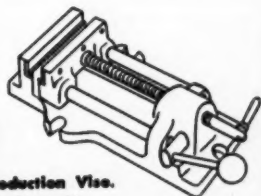
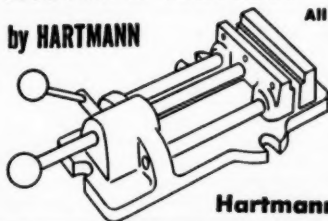
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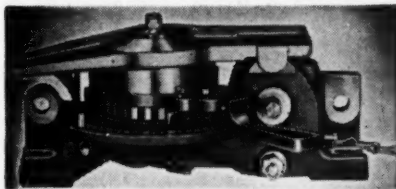
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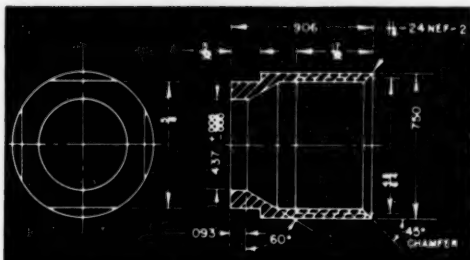
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Rotary Files, High-Speed Steel Ground Cutters, and Carbide Tools. A 12-page two-color bulletin (No. 57) released by R. G. Haskins Co., 2647 W. Harrison St., Chicago 12, Ill., makes possible the easy selection of the right file, cutter, end mill, or grinding burr for use with flexible shaft machines, portable tools, and precision high-speed machine tools. Complete with a recommended operating speed chart, dimensions, actual-size illustrations, and so on, the bulletin is said to be a valuable reference for anyone involved in finishing castings, metal patterns, dies, molds, and so on, or performing chamfering, countersinking, and deburring operations.

Stainless Steel Wire. A 20-page two-color booklet of technical data on the application of Allegheny Metal stainless steel wire has been published by Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa. Tables of physical properties, corrosion resistance, and analysis are included to help in considering the various types. A discussion of the principal uses of stainless wire covers cold heading, weaving, heat-resisting belts, rope, spring wire, slide forming, welding, and winding.

Jig Borer. An eight-page three-color circular (No. 559) released by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn., fully describes and illustrates its No. 2E "Electrolimit" Jig Borer. Data on features of the machine and complete specifications are included.

"Wherever There's Industry," a 32-page booklet containing 46 case studies on abrasive-belt methods which effected savings on machining operations in a variety of industries, has been released by Porter-Cable Machine Co., 1363 N. Salina St., Syracuse 8, N. Y. The booklet contains more than 100 illustrations.

Clad Steel Sample Kit. To aid engineers and fabricators in the selection of desired finishes on clad steel plates, Lukens Steel Co., 517 Strode Ave., Coatesville, Pa., has prepared a sample kit which is available only to qualified buyers and users of clad steel. Actual samples, polished to various finishes, are contained in pockets of a convenient reference folder. Samples include such clad steels as nickel-clad, stainless-clad, Inconel-clad, Monel-clad, and copper-clad.

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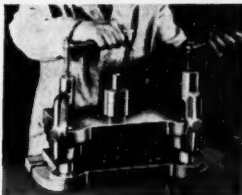
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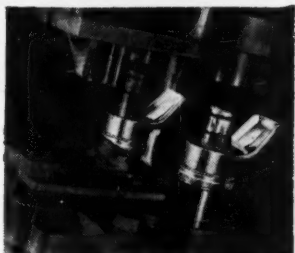


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Precision Boring and Milling Machines. A 24-page two-color catalog released by DeVlieg Machine Co., 480 Fair Ave., Ferndale 20, Mich., describes and illustrates its complete range of "Spiramatic Jigmill" Precision Boring and Milling Machines which are said to combine accuracy, power, rigidity, and facility of operation in the processing of one-piece jobs or production work. Information on various applications, data on accessories and features, spindle bar and flange dimensions, and general specifications are included in the catalog.

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Diamond Tool Indexing Device. A hand-operated diamond tool indexing device, designated as the Type K Handexer, for cylindrical grinders is fully described and illustrated in a four-page two-color catalog released by Koebel Diamond Tool Co., 9456 Grinnell Ave., Detroit 13, Mich. Specifications of the various models available are included.

Master Type Sets. A four-page two-color bulletin (No. 32T) released by Green Instrument Co., 392 Putnam Ave., Cambridge 39, Mass., illustrates 15 styles of letters and numerals in master type sets. Also shown are technical symbols, Greek upper and lower case alphabets, circle templates, and special master brass templates. Reversed master type sets available for engraving on the back of transparent materials and for die and mold work are illustrated.

Pneumatic Tools. A 28-page illustrated catalog (No. 70) released by Mall Tool Co., 7814 S. Chicago Ave., Chicago 19, Ill., fully describes its line of die grinders, small and large wheel grinders, drills, polishers, screw drivers, sanders, circular saws, chain saws, screw driver attachments, balance reels, and mounted wheels. Complete specifications on each type tool are included.

Filtration Equipment Case Studies. United States Hoffman Machinery Corp., Industrial Filtration Division, 219 Lamson St., Syracuse 6, N. Y., has launched a series of printed case studies which report specific accomplishments of industrial plants operating Hoffman filtration equipment. The first two of these reports cover the Teale Machine Company, Inc., and General Railway Signal Company, both of Rochester, N. Y. Other studies are now being printed or are in preparation and will be available shortly.

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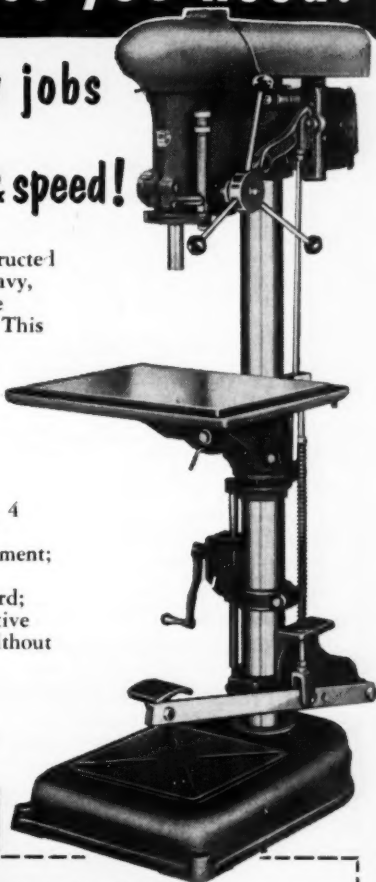
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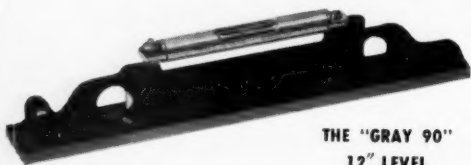
Counterbores, Countersinks, and Core Drills. Modern Corp., Box 68, College Park Station, Detroit 21, Mich., has issued a catalog on its line of counterbores, countersinks, and core drills. Designed for quick reference, the catalog supplies complete engineering and buying data and covers a wide range of sizes and types. A section on inserted-blade cutters is also included.

Broaches, Bars, and Fixtures. A four-page two-color folder issued by Cleveland Broach, Inc., 1061 E. 260th St., Cleveland 23, Ohio, describes and illustrates its facilities for designing and building micro-precision broach tooling and fixtures for special or standard purposes and for every type, size, and make of broaching machines. Information on the company's resharping and reconditioning service is included.

Rivet Tools. The Hi-Shear Rivet Tool Co., 8924 Bellanca Ave., Los Angeles 45, Calif., has issued a 20-page illustrated catalog fully describing its entire line of rivet tools. Complete specifications for each type tool listed, as well as helpful line drawings, are included in the catalog.

Correction

The Gammons-Hoaglund Company type helical reamer referred to on page 146 of the May issue is of two flute design and not single flute design as stated by Fred Rogers, author of the article, "Diversifying the Use of the Taper Pin."



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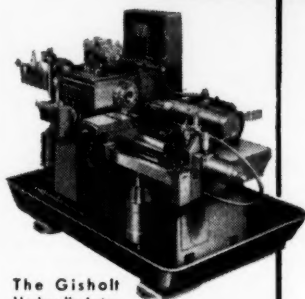
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Stamping Machines. A 12-page two-color bulletin (No. 15) issued by U. S. Tool Co., Inc., Ampere (East Orange), N. J., fully describes and illustrates its line of Multi-Slide Machines which are designed primarily for the automatic high-speed production of precision metal stampings from coil stock. Complete specifications and line drawings are included.

Honing Equipment. A 16-page two-color catalog issued by Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4, Mich., fully describes and illustrates its line of "Microhoning" and "Microflat" honing equipment for processing cylindrical surfaces and for finishing flat surfaces. Complete data on its honing machines, tools, and fixtures are provided, including specifications for each model.

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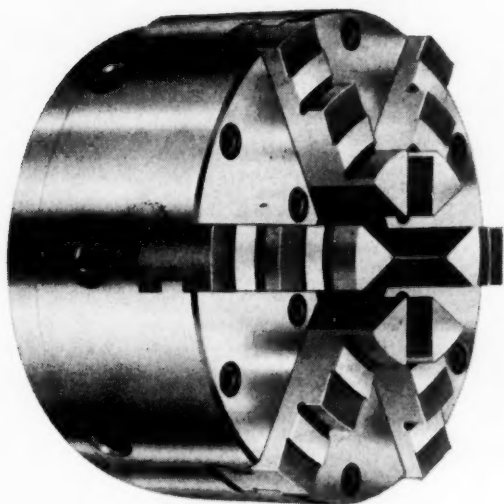
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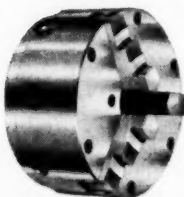
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A Pledge

On other pages in this issue you will note that as a means of calling attention to our silver anniversary year we have taken a brief look at the past twenty-five years. In gathering this material together, it was interesting to read through the very first issue, for therein is found an exposition of the basic principles upon which MODERN MACHINE SHOP was founded.

As we pay tribute this month to those who made the publishing of this magazine possible, we would take this opportunity to pledge ourselves anew to those basic principles as set down by Don G. Gardner and Howard Campbell. In their message to the readers in the first issue they said in part—

"It is planned to give the readers of MODERN MACHINE SHOP the best information concerning machine shop tools and methods that can be obtained. Shops which are unusual because of an interesting layout, method of operation, or selection of equipment, will be described in each issue. New equipment will be described and illustrated, but no plan, method, or practice will be advocated which has not stood the test of time and experience.

"In short, the principal function of MODERN MACHINE SHOP will be to search out and disseminate the best and newest ideas for the advancement of engineering skill and mechanical efficiency in the metal-working industry, and neither effort nor expense will be spared in the performance of this task."

Time and again down through the years, many changes have been made in matters concerning the publishing of the magazine, but the principles as stated above remain unchanged. They will always stand as a challenge to our best efforts.

— o —

Subscription Price

In our travels about the country, we often meet readers who tell us that they have been receiving MODERN MACHINE SHOP for years and frequently wonder why they have never been sent a bill for their subscription. Or, as most frequently happens, a person desiring to be placed on our mailing list will send money, a check or a money order to our circulation department manager. When this happens, we explain that MODERN MACHINE SHOP is a Controlled Circulation publication and, therefore, is mailed free of charge to key men engaged in metalworking operations. Our definition of a key man is that he is a production executive who is in a position to either buy or specify the purchase of metalworking tools and equipment.

Primarily, it is the manufacturer who places his advertising in MODERN MACHINE SHOP who makes possible the publishing of this magazine. He pays the freight, and all he asks in return is that the reader consider what he has to offer when in the market for new tools and equipment. In reality, the subscription price a reader pays is the time he spends in reading each issue.



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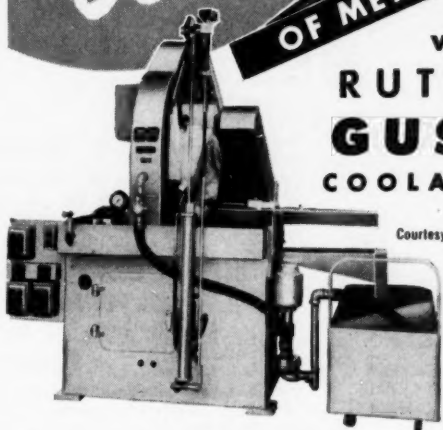
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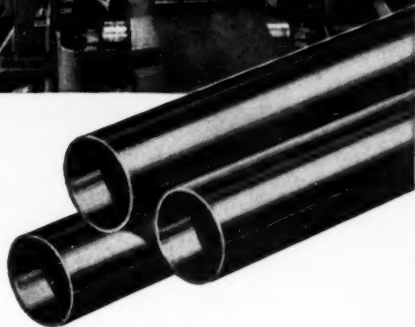
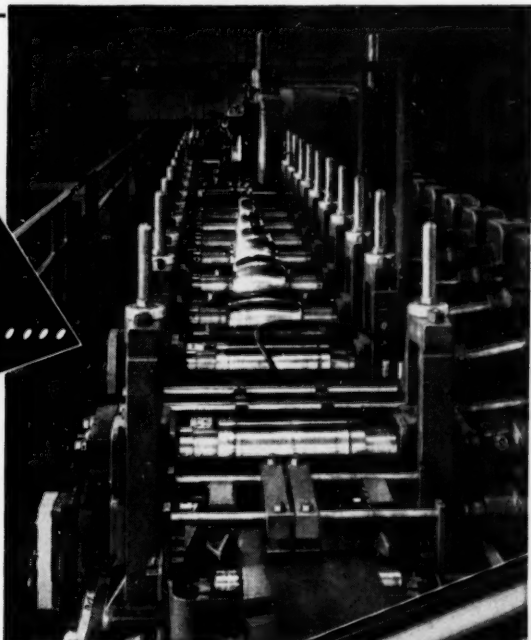
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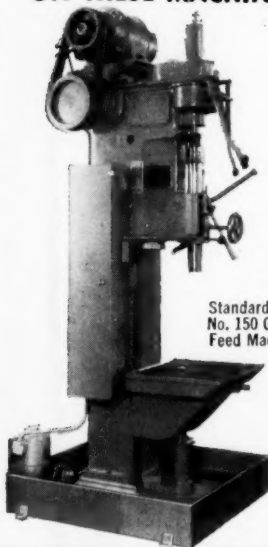
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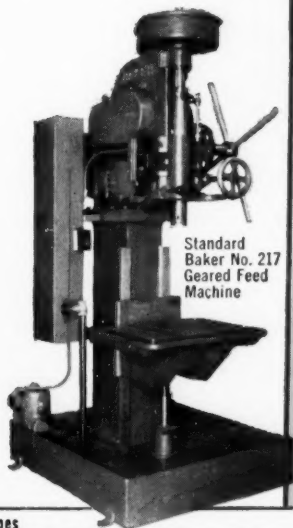
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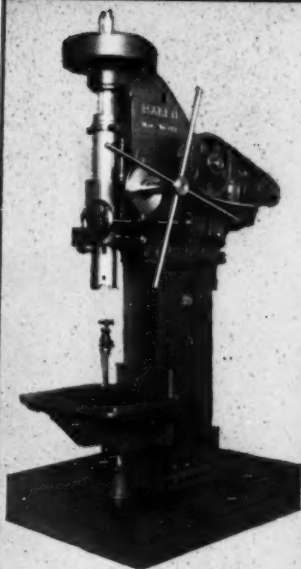
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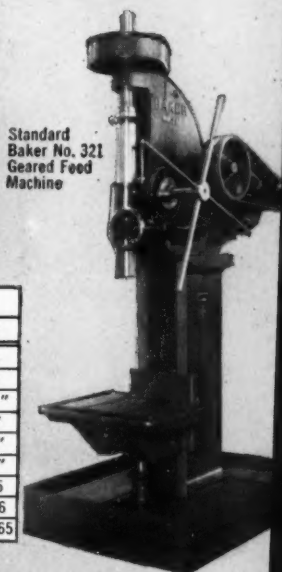
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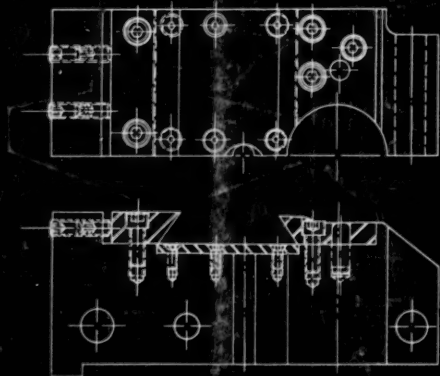
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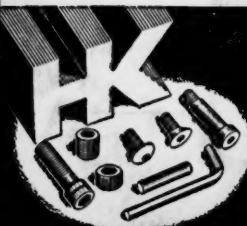
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